

# **ENVIRONMENTAL IMPACT ASSESSMENT REPORT**

**FOR**

**“ASSETZ LIFESTYLE - 63° EAST”**

**MODIFICATION AND EXPANSION OF RESIDENTIAL  
APARTMENT AND CONSTRUCTION OF ROW HOUSE**

**AT**

**SURVEY NOS. 69/1, 69/2, 69/3, 69/4 & 171,  
KODATHI VILLAGE, VARTHUR HOBLI,  
BENGALURU EAST TALUK, BENGALURU DISTRICT**

**PROMOTER:**



**M/s. APG INTELLI HOMES PRIVATE LIMITED  
BENGALURU**

**PREPARED BY:**

**KRS ENTERPRISES**

**66/15, 1<sup>ST</sup> FLOOR, 1<sup>ST</sup> CROSS, 1<sup>ST</sup> MAIN ROAD,  
GANGANAGAR, RT NAGAR, BENGALURU**

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## **TABLE OF CONTENTS**

|          |                                                                                             |
|----------|---------------------------------------------------------------------------------------------|
| <b>1</b> | <b>COMPLIANCE TO TERMS OF REFERENCE (TOR) AND ADDITIONAL TOR CONDITIONS FOR EIA STUDIES</b> |
| <b>2</b> | <b>EXECUTIVE SUMMARY</b>                                                                    |

| <b>Sl. No</b> | <b>CONTENT</b>                                     | <b>PAGE No.</b> |
|---------------|----------------------------------------------------|-----------------|
|               | <b>CHAPTER - 1: INTRODUCTION</b>                   | <b>1 - 11</b>   |
| 1.1           | PREAMBLE                                           | 1               |
| 1.2           | PURPOSE AND NEED OF THE PROJECT                    | 1               |
| 1.3           | BACKGROUND OF THE PROMOTERS                        | 3               |
| 1.4           | OBJECTIVES OF THE EIA STUDY                        | 4               |
| 1.5           | STAGES IN THE EIA STUDY                            | 5               |
| 1.6           | SCOPE OF ENVIRONMENTAL IMPACT ASSESSMENT           | 7               |
| 1.7           | STRUCTURE OF EIA REPORT                            | 9               |
| 1.8           | APPLICABLE ENVIRONMENTAL REGULATIONS AND STANDARDS | 10              |
|               |                                                    |                 |
|               | <b>CHAPTER - 2: PROJECT DESCRIPTION</b>            | <b>1-19</b>     |
| 2.1           | TYPE OF THE PROJECT                                | 1               |
| 2.2           | NEED FOR THE PROJECT                               | 1               |
| 2.3           | CRITERIA FOR SITE SELECTION                        | 2               |
| 2.4           | PROJECT SITE                                       | 2               |
| 2.5           | PROPOSED SCHEDULE AND APPROVAL FOR IMPLEMENTATION  | 6               |
| 2.6           | DESCRIPTION OF THE PROJECT                         | 6               |
| 2.7           | RESOURCE REQUIREMENTS                              | 12              |
| 2.7.1         | CONSTRUCTION PHASE                                 | 12              |
| 2.7.2         | OPERATION PHASE                                    | 14              |
| 2.8           | FIRE SAFETY MANAGEMENT SYSTEM                      | 18              |
| 2.9           | COMPATIBILITY WITH LOCAL BUILDING REGULATIONS      | 18              |
| 2.10          | ROAD CONNECTIVITY                                  | 19              |
|               |                                                    |                 |
|               | <b>CHAPTER - 3: DESCRIPTION OF THE ENVIRONMENT</b> | <b>1-41</b>     |
|               | INTRODUCTION                                       | 1               |
| 3.1           | LAND ENVIRONMENT                                   | 2               |
| 3.1.1         | LAND USE PATTERN                                   | 3               |
| 3.1.2         | GEOLOGICAL SETTING                                 | 4               |
| 3.1.3         | SOIL STRATA                                        | 6               |
| 3.2           | WATER ENVIRONMENT                                  | 9               |
| 3.2.1         | GROUND WATER TABLE                                 | 10              |

|                                                                               |                                                                      |             |
|-------------------------------------------------------------------------------|----------------------------------------------------------------------|-------------|
| 3.2.2                                                                         | SURFACE WATER QUALITY                                                | 11          |
| 3.2.3                                                                         | WATER QUALITY                                                        | 11          |
| 3.3                                                                           | AIR ENVIRONMENT                                                      | 16          |
| 3.3.1                                                                         | LOCAL METEOROLOGY                                                    | 16          |
| 3.3.2                                                                         | CLIMATOLOGY AND METEOROLOGY                                          | 18          |
| 3.3.3                                                                         | AMBIENT AIR QUALITY MONITORING                                       | 22          |
| 3.3.4                                                                         | AMBIENT AIR QUALITY STATUS                                           | 23          |
| 3.4                                                                           | NOISE ENVIRONMENT                                                    | 27          |
| 3.4.1                                                                         | NOISE LEVEL SURVEY                                                   | 27          |
| 3.5                                                                           | BIOLOGICAL ENVIRONMENT                                               | 30          |
| 3.5.1                                                                         | INTRODUCTION                                                         | 30          |
| 3.5.2                                                                         | OBJECTIVES AND METHODOLOGY                                           | 31          |
| 3.5.3                                                                         | BASELINE ECOLOGICAL DATA: FLORA DETAILS                              | 31          |
| 3.5.4                                                                         | BASELINE ECOLOGICAL DATA: FAUNA DETAILS                              | 33          |
| 3.6                                                                           | SOCIO-ECONOMIC ENVIRONMENT                                           | 34          |
| 3.7                                                                           | SOLID WASTE                                                          | 40          |
| 3.7.1                                                                         | SOLID AND HAZARDOUS WASTE GENERATED DURING CONSTRUCTION PHASE        | 41          |
| 3.7.2                                                                         | SOLID AND HAZARDOUS WASTE GENERATED DURING OPERATION PHASE           | 41          |
| <b>CHAPTER - 4: ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES</b> |                                                                      |             |
|                                                                               |                                                                      | <b>1-26</b> |
| 4.1                                                                           | INTRODUCTION                                                         | 1           |
| 4.2                                                                           | IMPACT IDENTIFICATION MATRIX                                         | 2           |
| 4.3                                                                           | ANTICIPATED IMPACT AND MITIGATION MEASURES DURING CONSTRUCTION PHASE | 4           |
| 4.3.1                                                                         | IMPACT ON AIR ENVIRONMENT                                            | 4           |
| 4.3.2                                                                         | IMPACT ON LAND ENVIRONMENT                                           | 5           |
| 4.3.2.1                                                                       | SOIL SUBSTRATA                                                       | 5           |
| 4.3.2.2                                                                       | CONSTRUCTION WASTES                                                  | 6           |
| 4.3.2.3                                                                       | LAND USE                                                             | 8           |
| 4.3.2.4                                                                       | NATURAL DRAINAGE SYSTEM                                              | 8           |
| 4.3.3                                                                         | IMPACT ON WATER ENVIRONMENT                                          | 9           |
| 4.3.4                                                                         | IMPACT ON NOISE ENVIRONMENT                                          | 9           |
| 4.3.5                                                                         | IMPACT ON ECOLOGY                                                    | 10          |
| 4.3.6                                                                         | IMPACT ON SOCIO-ECONOMIC ENVIRONMENT                                 | 11          |
| 4.4                                                                           | IMPACT MITIGATION MEASURES DURING CONSTRUCTION PHASE                 | 11          |
| 4.5                                                                           | ANTICIPATED IMPACTS AND MITIGATION MEASURES DURING OPERATION PHASE   | 13          |

|       |                                                                   |             |
|-------|-------------------------------------------------------------------|-------------|
| 4.5.1 | IMPACT ON LAND ENVIRONMENT & ITS MITIGATION MEASURES              | 13          |
| 4.5.2 | IMPACT ON AIR ENVIRONMENT & ITS MITIGATION MEASURES               | 14          |
| 4.5.3 | IMPACT ON WATER ENVIRONMENT & ITS MITIGATION MEASURES             | 15          |
| 4.5.4 | IMPACT ON NOISE ENVIRONMENT & ITS MITIGATION MEASURES             | 19          |
| 4.5.5 | IMPACT OF SOLID WASTE ASPECTS & ITS MITIGATION MEASURES           | 20          |
| 4.5.6 | IMPACTS ON ECOLOGY & ITS MITIGATION MEASURES                      | 22          |
| 4.5.7 | IMPACTS ON SOCIO-ECONOMIC ASPECTS                                 | 25          |
| 4.5.8 | IMPACTS OF NATURAL HAZARDS                                        | 26          |
| 4.6.  | OTHER CUMULATIVE MITIGATION MEASURES                              | 26          |
|       |                                                                   |             |
|       | <b>CHAPTER - 5: ALTERNATIVE TECHNOLOGIES AND SPECIFIC STUDIES</b> | <b>1-9</b>  |
| 5.1   | GENERAL                                                           | 1           |
| 5.2   | NEED OF ALTERNATIVES                                              | 1           |
| 5.3   | ALTERNATIVE TECHNOLOGY                                            | 2           |
| 5.3.1 | BUILDING MATERIALS                                                | 2           |
| 5.3.2 | GREEN BUILDINGS                                                   | 3           |
| 5.3.3 | ENERGY CONSERVATION                                               | 6           |
| 5.3.4 | TRANSPORTATION                                                    | 7           |
| 5.4   | ALTERNATIVE SITE                                                  | 8           |
|       |                                                                   |             |
|       | <b>CHAPTER - 6: ENVIRONMENTAL MONITORING PROGRAM</b>              | <b>1-8</b>  |
| 6.1   | INTRODUCTION                                                      | 1           |
| 6.2   | MONITORING AND REPORTING PROCEDURE                                | 2           |
| 6.2.1 | AMBIENT AIR QUALITY                                               | 3           |
| 6.2.2 | AMBIENT NOISE QUALITY                                             | 3           |
| 6.2.3 | WATER AND WASTEWATER QUALITY                                      | 4           |
| 6.2.4 | LANDSCAPE DEVELOPMENT                                             | 5           |
| 6.3   | INFRASTRUCTURE FOR ENVIRONMENTAL PROTECTION                       | 5           |
| 6.4   | COST PROVISION FOR ENVIRONMENT MANAGEMENT                         | 7           |
|       |                                                                   |             |
|       | <b>CHAPTER - 7: ADDITIONAL STUDIES</b>                            | <b>1-14</b> |
| 7.1   | ENVIRONMENTAL RISK ASSESSMENT AND DISASTER MANAGEMENT PLAN        | 1           |
| 7.2   | DISASTER MANAGEMENT PLAN (DMP)                                    | 9           |
| 7.3   | NATURAL RESOURCE CONSERVATION                                     | 12          |
| 7.4   | PUBLIC CONSULTATION                                               | 13          |
| 7.5   | RESETTLEMENT & REHABILITATION (R&R) ACTION PLAN                   | 13          |
|       |                                                                   |             |

|          |                                                           |             |
|----------|-----------------------------------------------------------|-------------|
|          | <b>CHAPTER - 8: PROJECT BENEFITS</b>                      | <b>1-9</b>  |
| 8.1      | GENERAL                                                   | 1           |
| 8.2      | IMPROVEMENT IN THE PHYSICAL INFRASTRUCTURE                | 1           |
| 8.3      | IMPROVEMENT IN THE SOCIAL INFRASTRUCTURE                  | 4           |
| 8.4      | EMPLOYMENT POTENTIAL                                      | 6           |
| 8.5      | OTHER TANGIBLE BENEFITS                                   | 7           |
|          | <b>CHAPTER - 9: ENVIRONMENTAL MONITORING PROGRAM</b>      | <b>1-25</b> |
| 9.1      | INTRODUCTION                                              | 1           |
| 9.2      | EMP DURING CONSTRUCTION PHASE                             | 2           |
| 9.2.1    | OBJECTIVES                                                | 2           |
| 9.2.2    | ENVIRONMENTAL AWARENESS TRAINING PRIOR TO COMMENCING WORK | 3           |
| 9.2.3    | DEMARCATON OF THE SITE                                    | 3           |
| 9.2.4    | LEVELLING AND SITE CLEARANCE                              | 3           |
| 9.2.5    | TRANSPORTATION OF CONSTRUCTION MATERIALS                  | 4           |
| 9.2.6    | CONSTRUCTION ACTIVITIES                                   | 5           |
| 9.2.7    | NOISE POLLUTION AND CONTROL                               | 6           |
| 9.2.8    | DUST POLLUTION AND CONTROL                                | 7           |
| 9.2.9    | SOIL EROSION AND SEDIMENTATION AND ITS CONTROL            | 7           |
| 9.2.10   | MATERIALS HANDLING AND STORAGE                            | 8           |
| 9.2.11   | WASTE MANAGEMENT                                          | 8           |
| 9.2.11.1 | WASTE WATER FROM CONSTRUCTION ACTIVITIES                  | 8           |
| 9.2.11.2 | WASTE WATER FROM CONSTRUCTION LABOURERS                   | 9           |
| 9.2.11.3 | SOLID WASTE MANAGEMENT                                    | 9           |
| 9.2.11.4 | DISPOSAL OF EXCAVATED EARTH AND DEMOLISHED MATERIAL       | 10          |
| 9.2.12   | PERSONNEL SAFETY SYSTEM                                   | 10          |
| 9.2.13   | HUMAN HEALTH AND SAFETY MANAGEMENT PLAN                   | 11          |
| 9.2.14   | EMERGENCY PROCEDURES                                      | 12          |
| 9.3      | EMP DURING OPERATION PHASE                                | 13          |
| 9.3.1    | AIR QUALITY MANAGEMENT                                    | 13          |
| 9.3.2    | WATER QUALITY MANAGEMENT                                  | 14          |
| 9.3.3    | NOISE QUALITY MANAGEMENT                                  | 15          |
| 9.3.4    | SOLID WASTE MANAGEMENT                                    | 16          |
| 9.3.5    | STORM WATER MANAGEMENT                                    | 17          |
| 9.3.6    | TRANSPORT MANAGEMENT                                      | 18          |
| 9.3.7    | GREENBELT DEVELOPMENT                                     | 18          |
| 9.3.8    | FIRE PROTECTION                                           | 18          |

|        |                                                             |            |
|--------|-------------------------------------------------------------|------------|
| 9.3.9  | HEALTH, RISK AND DISASTER MANAGEMENT                        | 19         |
| 9.4    | EMP IMPLEMENTATION SCHEDULE                                 | 21         |
| 9.5    | ENVIRONMENTAL LEGISLATIONS                                  | 21         |
| 9.6    | ENVIRONMENT PROTECTION ACT AND RULES                        | 22         |
| 9.7    | ENVIRONMENTAL STATEMENT                                     | 25         |
|        |                                                             |            |
|        | <b>CHAPTER - 10: SUMMARY &amp; CONCLUSION</b>               | <b>1-6</b> |
| 10.1   | EXECUTIVE SUMMARY                                           | 1          |
| 10.1.1 | INTRODUCTION                                                | 1          |
| 10.1.2 | PROJECT DESCRIPTION                                         | 1          |
| 10.1.3 | DESCRIPTION OF THE ENVIRONMENT                              | 1          |
| 10.1.4 | ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES   | 2          |
| 10.1.5 | ANALYSIS OF ALTERNATIVES                                    | 2          |
| 10.1.6 | ENVIRONMENTAL MONITORING PROGRAM                            | 3          |
| 10.1.7 | ADDITIONAL STUDIES                                          | 3          |
| 10.1.8 | PROJECT BENEFITS                                            | 3          |
| 10.1.9 | ENVIRONMENTAL MANAGEMENT PLAN                               | 3          |
| 10.2   | CONCLUSION ON EXECUTIVE SUMMARY                             | 4          |
|        |                                                             |            |
|        | <b>CHAPTER - 11: DISCLOSURE OF CONSULTANTS ENGAGED</b>      | <b>1-2</b> |
|        |                                                             |            |
|        | <b>CHAPTER - 12: CORPORATE ENVIRONMENTAL RESPONSIBILITY</b> | <b>1-7</b> |

**LIST OF TABLES**

| <b>Sl. No.</b> | <b>CONTENTS</b>                                                                                                         | <b>PAGE No.</b> |
|----------------|-------------------------------------------------------------------------------------------------------------------------|-----------------|
| Table-1.1      | PROPOSED TOR FOR ENVIRONMENTAL IMPACT ASSESSMENT                                                                        | <b>9</b>        |
| Table-1.2      | COMPLIANCE STATUS OF THE EXISTING PROJECT                                                                               | <b>11</b>       |
| Table-2.1      | ENVIRONMENTAL SETTING OF THE SITE                                                                                       | <b>2</b>        |
| Table-2.2      | PROJECT PLANNING DETAILS                                                                                                | <b>8</b>        |
| Table-2.3      | AREA STATEMENT                                                                                                          | <b>8</b>        |
| Table-2.4      | BUILDING -WISE DISTRIBUTION OF TOWERS                                                                                   | <b>8</b>        |
| Table-2.5      | DWELLINGS SUMMARY                                                                                                       | <b>9</b>        |
| Table-2.6      | DETAILS OF LAND USE WITHIN THE SITE                                                                                     | <b>9</b>        |
| Table-2.7      | COMPARATIVE STATEMENT OF THE SALIENT FEATURES OF THE EARLIER ENVIRONMENTAL CLEARANCE (EC) OBTAINED AND PRESENT PROPOSAL | <b>10</b>       |
| Table-2.8      | COST BREAKUP OF THE PROJECT                                                                                             | <b>12</b>       |
| Table-2.9      | MATERIALS DETAILS                                                                                                       | <b>12</b>       |
| Table-2.10     | WATER REQUIREMENT DURING CONSTRUCTION PURPOSE                                                                           | <b>13</b>       |
| Table-2.11     | SOLID WASTE GENERATION DURING CONSTRUCTION                                                                              | <b>13</b>       |
| Table-2.12     | WATER REQUIREMENT BREAK UP                                                                                              | <b>14</b>       |
| Table-2.13     | ESTIMATION OF SOLID WASTE GENERATION                                                                                    | <b>16</b>       |
| Table-2.14     | DETAILS OF POWER REQUIREMENT & BACKUP DETAILS                                                                           | <b>17</b>       |
| Table-2.15     | ENERGY SAVINGS DETAILS                                                                                                  | <b>17</b>       |
| Table-2.16     | PARKING SUMMARY DETAILS                                                                                                 | <b>19</b>       |
| Table-3.1      | ENVIRONMENTAL ATTRIBUTES & FREQUENCY OF MONITORING                                                                      | <b>2</b>        |
| Table-3.2      | IMPORTANT FEATURES WITHIN STUDY AREA                                                                                    | <b>3</b>        |
| Table-3.3      | SOIL SAMPLING LOCATIONS AROUND THE STUDY AREA                                                                           | <b>8</b>        |
| Table-3.4      | PHYSICO-CHEMICAL CHARACTERISTICS OF THE SOIL                                                                            | <b>9</b>        |
| Table-3.5      | WATER SAMPLING LOCATIONS                                                                                                | <b>11</b>       |
| Table-3.6      | GROUND WATER QUALITIES STANDARDS                                                                                        | <b>13</b>       |
| Table-3.7      | BASELINE GROUND WATER QUALITY IN THE SAMPLING LOCATIONS                                                                 | <b>14</b>       |
| Table-3.8      | BASELINE SURFACE WATER QUALITY IN THE SAMPLING LOCATIONS                                                                | <b>15</b>       |
| Table-3.9      | HUMIDITY RAINFALL & TEMPERATURE                                                                                         | <b>21</b>       |
| Table-3.10     | AIR ANALYSIS METHOD                                                                                                     | <b>23</b>       |
| Table-3.11     | AMBIENT AIR QUALITY MONITORING LOCATIONS                                                                                | <b>24</b>       |
| Table-3.12     | NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)                                                                          | <b>25</b>       |
| Table-3.13     | AMBIENT AIR QUALITY PARAMETERS RESULTS                                                                                  | <b>26</b>       |
| Table-3.14     | NOISE QUALITY MONITORING LOCATIONS                                                                                      | <b>28</b>       |
| Table-3.15     | AMBIENT NOISE STANDARDS                                                                                                 | <b>30</b>       |
| Table-3.16     | MEASURED AMBIENT NOISE LEVELS DB (A)                                                                                    | <b>30</b>       |
| Table-3.17     | LIST OF AVIFAUNA SIGHTED IN THE REGION                                                                                  | <b>33</b>       |
| Table-3.18     | DEMOGRAPHICAL PATTERN                                                                                                   | <b>37</b>       |
| Table-4.1      | IMPACT IDENTIFICATION MATRIX                                                                                            | <b>2</b>        |
| Table-4.2      | ENVIRONMENTAL IMPACTS DUE TO CONSTRUCTION                                                                               | <b>2</b>        |

|            | ACTIVITIES                                                   |    |
|------------|--------------------------------------------------------------|----|
| Table-4.3  | ENVIRONMENTAL IMPACTS DURING OPERATION PHASE                 | 3  |
| Table-4.4  | EXCAVATED EARTH AND MANAGEMENT DETAILS                       | 6  |
| Table-4.5  | QUALITY OF TREATED SEWAGE FOR URBAN REUSE                    | 17 |
| Table-4.6  | LIST OF EXISTING SPECIES                                     | 24 |
| Table-4.7  | LIST OF SPECIES FOR THE PROPOSED PROJECT                     | 24 |
| Table-5.1  | ENERGY SAVINGS DETAILS                                       | 7  |
| Table-6.1  | QUALITY OF TREATED SEWAGE FOR URBAN REUSE                    | 5  |
| Table-6.2  | LIST OF EQUIPMENTS USED AND TEST METHOD                      | 6  |
| Table-6.3  | MONITORING SCHEDULE FOR ENVIRONMENTAL PARAMETERS             | 6  |
| Table-6.4  | BUDGETARY PROVISION FOR ENVIRONMENTAL MANAGEMENT PLAN        | 7  |
| Table-6.5  | ENVIRONMENTAL MONITORING PLAN & COST DURING OPERATION PHASE  | 8  |
| Table-9.1  | ENVIRONMENTAL MANAGEMENT DURING LEVELLING AND SITE CLEARANCE | 4  |
| Table-9.2  | ENVIRONMENTAL MANAGEMENT DURING LEVELLING AND SITE CLEARANCE | 4  |
| Table-9.3  | ENVIRONMENTAL MANAGEMENT DURING CONSTRUCTION                 | 5  |
| Table-9.4  | AIR QUALITY MANAGEMENT DURING OPERATION PHASE                | 13 |
| Table-9.5  | WATER QUALITY MANAGEMENT DURING OPERATION PHASE              | 14 |
| Table-9.6  | WASTEWATER DISPOSAL                                          | 15 |
| Table-9.7  | NOISE MANAGEMENT DURING OPERATION PHASE                      | 15 |
| Table-9.8  | IMPLEMENTATION SCHEDULE FOR EMP                              | 21 |
| Table-9.9  | PARTICULARS OF ENVIRONMENTAL LEGISLATIONS                    | 21 |
| Table-9.10 | NOTIFICATIONS UNDER ENVIRONMENTAL PROTECTION ACT & RULES     | 22 |
| Table-9.11 | COLOUR CODE FOR THE MANIFEST COPIES                          | 24 |
| Table-11.1 | PROJECT DESIGN TEAM                                          | 1  |



**LIST OF FIGURES**

| <b>Sl. No.</b> | <b>CONTENTS</b>                                                                           | <b>PAGE No.</b> |
|----------------|-------------------------------------------------------------------------------------------|-----------------|
| Figure-2.1     | VICINITY OF THE PROJECT SITE                                                              | 3               |
| Figure-2.2     | LOCATION OF THE PROPOSED PROJECT SITE                                                     | 4               |
| Figure-2.3     | AERIAL VIEW OF THE PROJECT SITE                                                           | 4               |
| Figure-2.4     | TOPO MAP OF THE PROJECT SITE                                                              | 5               |
| Figure-2.5     | CDP MAP OF THE PROJECT SITE                                                               | 6               |
| Figure-2.6     | WATER BALANCE CHART                                                                       | 15              |
| Figure-3.1     | GENERAL LAND USE AND CROPPING PATTERN OF BENGALURU (URBAN & RURAL) DISTRICT (SOURCE: GSI) | 4               |
| Figure-3.2     | GEOLOGICAL SETTINGS OF BENGALURU (URBAN & RURAL) DISTRICT (SOURCE: GSI)                   | 6               |
| Figure-3.3     | SOIL SAMPLING LOCATION                                                                    | 8               |
| Figure-3.4     | IRRIGATION & HYDROLOGY (SOURCE: GSI)                                                      | 10              |
| Figure-3.5     | WATER SAMPLING LOCATIONS                                                                  | 12              |
| Figure-3.6     | WIND ROSE DIAGRAM                                                                         | 17              |
| Figure-3.7     | TEMPERATURE AND RAINFALL PATTERN (SOURCE: GSI)                                            | 20              |
| Figure-3.8     | AIR SAMPLING LOCATIONS                                                                    | 25              |
| Figure-3.9     | NOISE SAMPLING LOCATIONS                                                                  | 29              |

**LIST OF ANNEXURES**

| <b>Sl. No.</b> | <b>CONTENTS</b>                                                                   |
|----------------|-----------------------------------------------------------------------------------|
| Annexure- 1    | Earlier Environmental clearance (EC) copy                                         |
| Annexure- 2    | Compliance to earlier EC                                                          |
| Annexure- 3    | Earlier Consent for Establishment (CFE) copy                                      |
| Annexure- 4    | Land documents (A. Sale Deed, B. RTC, C. Conversion)                              |
| Annexure- 5    | Modified site plan                                                                |
| Annexure- 6    | Contour plan of the project site                                                  |
| Annexure- 7    | NOC for the supply of water from Karnataka Groundwater Development Authority      |
| Annexure- 8    | STP feasibility report                                                            |
| Annexure- 9    | Traffic study and management report                                               |
| Annexure- 10   | Geotechnical investigation report                                                 |
| Annexure- 11   | Baseline study Analysis reports (Air, Water, Noise, Soil)                         |
| Annexure- 12   | Undertaking letter for utilization of STP treated water for construction purposes |
| Annexure- 13   | CDP duly marking the project site                                                 |
| Annexure- 14   | Plumbing plan                                                                     |
| Annexure- 15   | Landscape plan                                                                    |
| Annexure- 16   | Pre-certified Gold from Indian Green Building Council (IGBC)                      |
| Annexure- 17   | Emergency and response plan                                                       |
| Annexure- 18   | A. Earlier Sanctioned plan from BDA<br>B. Corrigendum letter                      |
| Annexure- 19   | Obtained sanctioned plan for environmental Clearance from SEIAA                   |
| Annexure- 20   | Village map                                                                       |
| Annexure- 21   | Authenticated document for installing water efficient fixtures                    |
| Annexure- 22   | Terrace plan for harnessing solar energy                                          |
| Annexure- 23   | Hydrological study report                                                         |
| Annexure- 24   | Airport Authority India NOC                                                       |
| Annexure- 25   | Topo sheet duly marking the project site                                          |
| Annexure- 26   | Latest Google Map duly marking the project site                                   |
| Annexure- 27   | Latest Site Photographs                                                           |
| Annexure- 28   | Electrical plan                                                                   |



## State Level Environment Impact Assessment Authority-Karnataka

(Constituted by MoEF, Government of India, under section 3(3) of E(P) Act, 1986)

No. SEIAA 60 CON 2017

Date: 28-04-2017

To,

M/s. APG Intelli Homes Pvt Ltd,  
Embassy Icon, Ground Floor,  
3 Infantry road,  
Bangalore.

Sir,

Sub: Expansion of "Assetz Lifestyle 63<sup>rd</sup> East" residential apartment and villas project at Sy.No's. 69/1, 69/2, 69/3, 69/4 & 171 of Kodathi Village, Varthur Hobli, Bengaluru East Taluk, Bengaluru District - issue of ToRs and additional ToRs Regarding.

Ref: Proceedings of the 181<sup>st</sup> SEAC meeting held on 19<sup>th</sup>, 20<sup>th</sup> and 21<sup>st</sup> April 2017

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This has reference to your online application dated 10<sup>th</sup> April, 2017 bearing proposal No.SIA/KA/NCP/19096/2017 addressed to SEIAA, Karnataka on the subject mentioned above along with Form-1, Form 1A, conceptual plan as per the EIA Notification, 2006.

It is a proposal seeking Environmental clearance for proposed expansion of residential apartment and villas project at Sy.No's. 69/1, 69/2, 69/3, 69/4 & 171 of Kodathi Village, Varthur Hobli, Bengaluru East Taluk, Bengaluru District. This is a project covered under SLNo.8 (b) of the Schedule Under Township and area Development Projects of EIA Notification 2006 and amendments made there on.

It is, inter-alia, noted that the proposed expansion of "Assetz Lifestyle 63<sup>rd</sup> East" residential apartment and villas project on a total plot area of 1,06,786.42 sqm inclusive of the proposed expansion of 88,854.42 sqm and total built up area of 2,94,283.80 sqm inclusive of the proposed expansion of 1,65,135.82 sqm. The proposed project under expansion consists of 2060 No's of residential units. The cost of the project is Rs.457 Crores.

The State Expert Appraisal Committee (SEAC), Karnataka has considered the proposal during its meeting held on 20<sup>th</sup> April 2017. Based on the consideration of the documents submitted and the presentation made by you and the environment consultant Sri.Mahadevaswamy, Bangalore the Committee prescribed the following Terms of Reference (ToR) for preparing EIA/EMP report with at least one season baseline data other than monsoon for the above mentioned project.



State Level Environment Impact Assessment Authority-Karnataka

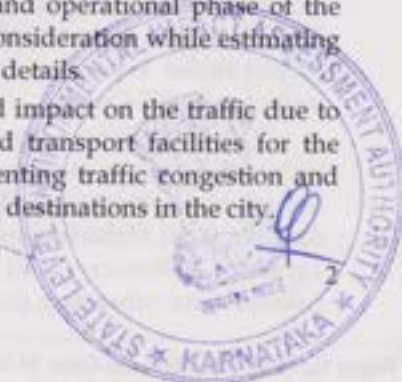
(Constituted by MoEF, Government of India under section 3(3) of EIA Act, 1986)

SEIAA 60 CON 2017

"Assetz Lifestyle 63<sup>rd</sup> East" residential apartment and villas project  
by APG Intelli Homes Pvt. Ltd.,

The SEIAA Karnataka after due consideration of the relevant documents submitted by the project proponent, and the recommendation of the SEAC have in its meeting held on 26<sup>th</sup> April 2017 and decided to accord the Standard Terms of Reference (TOR) along with additional Terms of Reference, in accordance with the provisions of Environmental Impact Assessment Notification-2006 and its subsequent amendments made there on.

1. Examine details of land use as per Master Plan and land use around 10 km radius of the project site. Analysis should be made based on latest satellite imagery for land use with raw images. Check on flood plain of any river.
2. Submit details of environmentally sensitive places, land acquisition status, rehabilitation of communities/villages and present status of such activities.
3. Examine baseline environmental quality along with projected incremental load due to the project.
4. Environmental data to be considered in relation to the project development would be (a) land (b) groundwater (c) surface water (d) air (e) bio-diversity (f) noise and vibrations (g) socio economic and health.
5. Submit a copy of the contour plan with slopes, drainage pattern of the site and surrounding area. Any obstruction of the same by the project.
6. Submit the details of the trees to be felled for the project.
7. Submit the present land use and permission required for any conversion such as forest, agriculture etc.
8. Submit Roles and responsibility of the developer etc for compliance of environmental regulations under the provisions of EP Act.
9. Ground water classification as per the Central Ground Water Authority.
10. Examine the details of Source of water, water requirement, use of treated waste water and prepare a water balance chart.
11. Rain water harvesting proposals should be made with due safeguards for ground water quality. Maximize recycling of water and utilization of rain water. Examine details.
12. Examine soil characteristics and depth of ground water table for rainwater harvesting.
13. Examine details of solid waste generation treatment and its disposal.
14. Examine and submit details of use of solar energy and alternative source of energy to reduce the fossil energy consumption. Energy conservation and energy efficiency.
15. DG sets are likely to be used during construction and operational phase of the project. Emissions from DG sets must be taken into consideration while estimating the impacts on air environment. Examine and submit details.
16. Examine road/rail connectivity to the project site and impact on the traffic due to the proposed project. Present and future traffic and transport facilities for the region should be analysed with measures for preventing traffic congestion and providing faster trouble free system to reach different destinations in the city.



**State Level Environment Impact Assessment Authority-Karnataka**

(Constituted by MoEF, Government of India under section 3(3) of E(P) Act, 1986)

SEIAA 60 CON 2017

"Assetz Lifestyle 63<sup>rd</sup> East" residential apartment and villas project  
by APG Intelli Homes Pvt. Ltd.,

17. A detailed traffic and transportation study should be made for existing and projected passenger and cargo traffic.
18. Examine the details of transport of materials for construction which should include source and availability.
19. Examine separately the details for construction and operation phases both for Environmental Management Plan and Environmental Monitoring Plan with cost and parameters.
20. Submit details of a comprehensive Disaster Management Plan including emergency evacuation during natural and man-made disaster.
21. Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.
22. The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.
23. Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website "<http://moef.nic.in/Manual/Townships>".

**Additional TOR:**

1. Land use details in the earlier sanctioned plan to know the status of the land proposed for expansion.
2. The land area for which EC has been issued earlier is 17.77 Acres and additional area acquired for this expansion is about 9 Acres. With this addition of nearly 50% of area, the built up area is getting increased to about 120%. This is to be justified.
3. Village map showing Nala details, Kharab land details and its position along with supporting RTC documents are to be submitted and implications on the proposed project site to be explained with respect to NGT order OA 222/2014 dated 04.05.2016.
4. Explore the possibility of alternate source for water other than tankers and borewells.
5. Scientific assessment of the availability of the water from the bore well in the project site
6. Revised water balance calculating fresh water demand at the rate of 55 LPCD as per the norms prescribed for rural water supply and the scheme for meeting the additional requirement
7. Scheme for treating sewage and sullage separately and use of treated water within the project site.
8. Quantification of the terrace area available for harnessing solar energy and an appropriate plan thereof with due calculations.
9. Scheme for providing dual fuel generators for backup power with provision for CNG.
10. Scheme for utilisation of entire Rain Water harvested in the project site (both from the roof top and from the surface runoff) within the Project premises only.



State Level Environment Impact Assessment Authority-Karnataka

(Constituted by MoEF, Government of India under section 3(3) of E(P) Act, 1986)

SEIAA 60 CON 2017

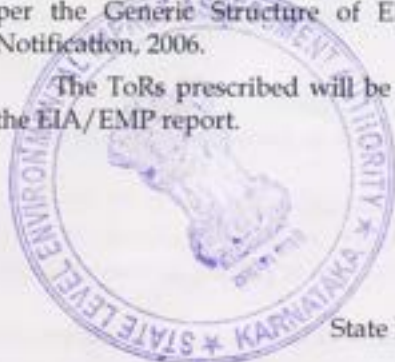
"Assetz Lifestyle 63<sup>rd</sup> East" residential apartment and villas project  
by APG Intelli Homes Pvt. Ltd.,

11. Details of excavated earth and plan for safe and scientific utilization of the same within the project site.
12. Hydrological study of the area influencing the surface water flow considering the micro watershed network of the region with respect to adequacy of the nala and carrying capacity.

The consultants involved in the preparation of EIA/EMP report after accreditation with Quality Council of India/National Accreditation Board of Education and Training (QCI/NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and the data provided by other Organization(s)/Laboratories including their status of approvals etc. In this regard Office Memorandum No. F. No. J-11013/77/2004-IA.II(I) dated 30th June, 2011 available on the MoEF, GoI website <http://www.moef.nic.in> may please be referred.

The Terms of Reference (ToR) prescribed by the State Expert Appraisal Committee (SEAC), Karnataka should be considered for the preparation of EIA / EMP report for the above mentioned project in addition to all the relevant information as per the Generic Structure of EIA given in Appendix III and IIIA in the EIA Notification, 2006.

The ToRs prescribed will be valid for a period of three years for submission of the EIA/EMP report.



  
Member Secretary,

State Level Environment Impact Assessment Authority,  
Karnataka.

Copy to:-

1. Chairman, Karnataka State Pollution Control Board, KSPCB, Parisara Bhavan, 4<sup>th</sup> & 5<sup>th</sup> Floor, church street, Bangalore for information.
2. Guard File.

## **TERMS OF REFERENCE (TOR)**

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### **TERMS OF REFERENCE FOR EIA STUDIES & COMPLIANCE TO TOR CONDITIONS**

| <b>Sl. no.</b> | <b>Terms of reference</b>                                                                                                                                                                                                       | <b>Compliance</b>                                                                                                                                           |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.             | Examine details of land use as per Master plan and land use around 10 km radius of the project site. Analysis should be made based on latest satellite imagery for land use with raw images. Check on flood plain of any river. | Details are incorporated in chapter-2                                                                                                                       |
| 2.             | Submit details of environmentally sensitive places, land acquisition status, rehabilitation of communities/ villages and present status of such activities                                                                      | Environmental settings of the site details are incorporated in Chapter-2 in page no. 13                                                                     |
| 3.             | Examine baseline environmental quality along with projected incremental load due to the project                                                                                                                                 | Details are incorporated in chapter-3                                                                                                                       |
| 4.             | Environmental data to be considered in relation to the project development would be (a) land (b) ground water (c) surface water (d) air (e) bio-diversity (f) noise and vibrations (g) socio economic and health                | Details of environmental data with relation to the project development are incorporated in Chapter-3                                                        |
| 5.             | Submit a copy of the contour plan with slopes, drainage pattern of the site and surrounding area. Any obstruction of the same by the project                                                                                    | Contour plan of the project site is enclosed as <b>Annexure-6</b>                                                                                           |
| 6.             | Submit the details of the trees to be felled for the project                                                                                                                                                                    | Details of the existing trees present in the project site including expansion area are incorporated in chapter-4                                            |
| 7.             | Submit the present land use and permission required for any conversion such as forest, agriculture etc.                                                                                                                         | Conversion of land from agricultural to residential purpose obtained from revenue department is enclosed as <b>Annexure-4</b>                               |
| 8.             | Submit roles and responsibility of the developer etc for compliance of environmental regulations under the                                                                                                                      | Copy of Environmental clearance obtained for the project earlier is enclosed as <b>Annexure- 1</b><br>Compliance report to previous Environmental clearance |

## **TERMS OF REFERENCE (TOR)**

|     |                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     | provisions of EP Act                                                                                                                                                                                                         | submitted to MoEF is enclosed as <b>Annexure-2</b>                                                                                                                                                                                                                                                                                                                                                                   |
| 9.  | Ground water classification as per the Central Ground Water Authority                                                                                                                                                        | Details are briefed in <b>Annexure-7</b>                                                                                                                                                                                                                                                                                                                                                                             |
| 10. | Examine the details of source of water, water requirement, use of treated waste water and prepare a water balance chart.                                                                                                     | The source of water supply during operation phase will be met from Bore well and obtained approval from Karnataka Groundwater Development Authority is enclosed as <b>Annexure-7</b> . Total water requirement is 1238 KLD (Fresh water and flushing water). Treated sewage water will be used for flushing, gardening, car & floor washing purpose. Water balance chart is incorporated in chapter-2 of Page No. 15 |
| 11. | Rain water harvesting proposals should be made with due safeguards for ground water quality. Maximize recycling of water and utilization of rain water. Examine details.                                                     | Details are incorporated in chapter-4 of Page No. 88                                                                                                                                                                                                                                                                                                                                                                 |
| 12. | Examine soil characteristics and depth of ground water table for rain water harvesting.                                                                                                                                      | Geotechnical investigation conducted for the proposed expansion project is enclosed as <b>Annexure-14</b>                                                                                                                                                                                                                                                                                                            |
| 13. | Examine details of solid waste generation treatment and its disposal                                                                                                                                                         | Solid waste generation, treatment and its disposal from the proposed project is incorporated in chapter-2 of Page No. 16                                                                                                                                                                                                                                                                                             |
| 14. | Examine and submit details of use of solar energy and alternative source of energy to reduce the fossil energy consumption. Energy conservation and energy efficiency.                                                       | Details are incorporated in chapter-2 of Page No. 17                                                                                                                                                                                                                                                                                                                                                                 |
| 15. | DG sets are likely to be used during construction and operational phase of the project. Emissions from DG sets must be taken into consideration while estimating the impacts on air environment. Examine and submit details. | Estimating the impacts on air environment is detailed in chapter-4 of Page No. 85                                                                                                                                                                                                                                                                                                                                    |
| 16. | Examine road/ rail connectivity to the project site and impact on the traffic                                                                                                                                                | Traffic management study report is enclosed as <b>Annexure-9</b>                                                                                                                                                                                                                                                                                                                                                     |



## TERMS OF REFERENCE (TOR)

|     |                                                                                                                                                                                                                                                         |                                                                                                                                                                     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     | due to the proposed project. Present and future traffic and transport facilities for the region should be analyzed with measures for preventing traffic congestion and providing faster trouble free system to reach different destinations in the city |                                                                                                                                                                     |
| 17. | A detailed traffic and transportation study should be made for existing and projected passenger and cargo traffic                                                                                                                                       | Details were explained in traffic report study                                                                                                                      |
| 18. | Examine the details of transport of materials for construction which should include source and availability                                                                                                                                             | Materials for construction will be sourced from locally and transported through trucks during day time and the vehicles will be operated only during non peak hours |
| 19. | Examine separately the details for construction and operation phases both for Environmental Management Plan and Environmental Monitoring Plan with cost and parameters                                                                                  | Details of construction and operation phases for Environmental Management Plan is detailed in chapter-9 and Environmental Monitoring Plan is detailed in chapter-6  |
| 20. | Submit details of the comprehensive Disaster management plan including emergency evacuation during natural and man-made disaster                                                                                                                        | Details are incorporated in <b>chapter-7</b> . On site emergency plan conducted for the proposed project is enclosed as <b>Annexure-17</b>                          |
| 21. | Details of litigation pending against the project, if any, with direction/ order passed by any Court of law against the project should be given.                                                                                                        | No litigation/court case pending against this proposed project in any court of law.                                                                                 |
| 22. | The cost of the project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out                                                                                                                 | The estimated project cost is Rs. 457 crores including existing. Cost details break up are incorporated in Chapter-2. EMP cost breakup is showed in chapter-6       |
| 23. | Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measures, project proponent can refer to the model TOR available on Ministry website                                        | Compiled                                                                                                                                                            |

## TERMS OF REFERENCE (TOR)

|                                                  | <a href="http://moef.nic.in/manual/Townships">http://moef.nic.in/manual/Townships</a>                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |                      |                       |           |                 |             |             |                 |             |      |                      |           |       |               |           |       |                                                  |          |       |                                  |         |      |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------|-----------------------|-----------|-----------------|-------------|-------------|-----------------|-------------|------|----------------------|-----------|-------|---------------|-----------|-------|--------------------------------------------------|----------|-------|----------------------------------|---------|------|
| Additional TOR                                   |                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |                      |                       |           |                 |             |             |                 |             |      |                      |           |       |               |           |       |                                                  |          |       |                                  |         |      |
| 1.                                               | Land use details in the earlier sanctioned plan to know the status of the land proposed for expansion                                                                                                                                                         | <div>In the previous EC, plan has been sanctioned for constructing Tower B, C &amp; D of built up area of about 1,29,147.98 Sqmt in 17.775 Acres of site area. The land-use details in the previous EC are mentioned below.</div> <table><tr><th>Description of usage</th><th>Area in Sqmt</th><th>%usage</th></tr><tr><td>Total site area</td><td>71,932.27</td><td>100</td></tr><tr><td>Civic amenities</td><td>3,605.53</td><td>5.01</td></tr><tr><td>Ground coverage area</td><td>14,068.66</td><td>19.56</td></tr><tr><td>Driveway area</td><td>10,222.28</td><td>14.21</td></tr><tr><td>Landscape area<br/>(Also future development area)</td><td>41,893.6</td><td>58.24</td></tr><tr><td>Surface parking<br/>/Service area</td><td>2,142.2</td><td>2.98</td></tr></table> <div>Copy of sanctioned plan obtained from SEIAA, Karnataka is enclosed as <b>Annexure-19</b></div>                                                                                     |             | Description of usage | Area in Sqmt          | %usage    | Total site area | 71,932.27   | 100         | Civic amenities | 3,605.53    | 5.01 | Ground coverage area | 14,068.66 | 19.56 | Driveway area | 10,222.28 | 14.21 | Landscape area<br>(Also future development area) | 41,893.6 | 58.24 | Surface parking<br>/Service area | 2,142.2 | 2.98 |
| Description of usage                             | Area in Sqmt                                                                                                                                                                                                                                                  | %usage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |             |                      |                       |           |                 |             |             |                 |             |      |                      |           |       |               |           |       |                                                  |          |       |                                  |         |      |
| Total site area                                  | 71,932.27                                                                                                                                                                                                                                                     | 100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |                      |                       |           |                 |             |             |                 |             |      |                      |           |       |               |           |       |                                                  |          |       |                                  |         |      |
| Civic amenities                                  | 3,605.53                                                                                                                                                                                                                                                      | 5.01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                      |                       |           |                 |             |             |                 |             |      |                      |           |       |               |           |       |                                                  |          |       |                                  |         |      |
| Ground coverage area                             | 14,068.66                                                                                                                                                                                                                                                     | 19.56                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                      |                       |           |                 |             |             |                 |             |      |                      |           |       |               |           |       |                                                  |          |       |                                  |         |      |
| Driveway area                                    | 10,222.28                                                                                                                                                                                                                                                     | 14.21                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                      |                       |           |                 |             |             |                 |             |      |                      |           |       |               |           |       |                                                  |          |       |                                  |         |      |
| Landscape area<br>(Also future development area) | 41,893.6                                                                                                                                                                                                                                                      | 58.24                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                      |                       |           |                 |             |             |                 |             |      |                      |           |       |               |           |       |                                                  |          |       |                                  |         |      |
| Surface parking<br>/Service area                 | 2,142.2                                                                                                                                                                                                                                                       | 2.98                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                      |                       |           |                 |             |             |                 |             |      |                      |           |       |               |           |       |                                                  |          |       |                                  |         |      |
| 2.                                               | The land area for which EC has been issued earlier is 17.77 Acres and additional area acquired for this expansion is about 9 Acres. With this additional of nearly 50% of area, the built up area is getting increased to about 120%. This is to be justified | <div>Earlier EC has been issued for land area of 17.77 Acres with the builtup area of 1,29,147.98 sq.m with construction of three towers- B, C, D. The Ground coverage area considered is about 14,068.66Sqmt (19.56% of site area) and also portion of land is left for future development as shown in the <b>Annexure-19</b>.</div> <div>Additional area acquired for the expansion of the project is 9 acres.</div> <div>Total builtup area after modification and expansion will be 2,77,407 Sqmt.</div> <div>The project proposal includes modification and expansion. In the modification the existing Tower-B builtup area will be increased. Addition to that additional tower-A &amp; E will be developed.</div> <div>Details are tabulated as follows</div> <table><tr><th>Site Area</th><th>Built-up area in sqmt</th><th>Buildings</th><th>Remarks</th></tr><tr><td>17.77 Acres</td><td>1,29,147.98</td><td>Developing</td><td>Previous EC</td></tr></table> |             | Site Area            | Built-up area in sqmt | Buildings | Remarks         | 17.77 Acres | 1,29,147.98 | Developing      | Previous EC |      |                      |           |       |               |           |       |                                                  |          |       |                                  |         |      |
| Site Area                                        | Built-up area in sqmt                                                                                                                                                                                                                                         | Buildings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Remarks     |                      |                       |           |                 |             |             |                 |             |      |                      |           |       |               |           |       |                                                  |          |       |                                  |         |      |
| 17.77 Acres                                      | 1,29,147.98                                                                                                                                                                                                                                                   | Developing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Previous EC |                      |                       |           |                 |             |             |                 |             |      |                      |           |       |               |           |       |                                                  |          |       |                                  |         |      |

## TERMS OF REFERENCE (TOR)

|              |                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |                                   |                             |             |      |                         |      |                   |               |      |                   |               |      |                   |               |      |                   |               |              |                   |                                                             |              |                     |                                                          |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------|-----------------------------|-------------|------|-------------------------|------|-------------------|---------------|------|-------------------|---------------|------|-------------------|---------------|------|-------------------|---------------|--------------|-------------------|-------------------------------------------------------------|--------------|---------------------|----------------------------------------------------------|
|              |                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  | Tower B,C & D                     |                             |             |      |                         |      |                   |               |      |                   |               |      |                   |               |      |                   |               |              |                   |                                                             |              |                     |                                                          |
|              |                                                                                                                                                                                                                                                   | 1,24,818.08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  | Tower - B, C, D                   | Modification in previous EC |             |      |                         |      |                   |               |      |                   |               |      |                   |               |      |                   |               |              |                   |                                                             |              |                     |                                                          |
|              |                                                                                                                                                                                                                                                   | 1,11,196.11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  | Tower - A & E                     | Expansion                   |             |      |                         |      |                   |               |      |                   |               |      |                   |               |      |                   |               |              |                   |                                                             |              |                     |                                                          |
|              | 17.77Acres                                                                                                                                                                                                                                        | 2,36,014.19                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  | Tower - A, B, C, D, E & F         |                             |             |      |                         |      |                   |               |      |                   |               |      |                   |               |      |                   |               |              |                   |                                                             |              |                     |                                                          |
|              | 8.61 Acres                                                                                                                                                                                                                                        | 41 392.81                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  | Tower F & Row house               | Expansion                   |             |      |                         |      |                   |               |      |                   |               |      |                   |               |      |                   |               |              |                   |                                                             |              |                     |                                                          |
|              | 26.38 Acres                                                                                                                                                                                                                                       | 2,77,407 Sqmt                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  | Tower A, B, C, D, E,F & Row house | Modification and Expansion  |             |      |                         |      |                   |               |      |                   |               |      |                   |               |      |                   |               |              |                   |                                                             |              |                     |                                                          |
| 3.           | Village map showing Nala details, Kharab land details and its position along with supporting RTC documents are to be submitted and implications on the proposed project site to be explained with respect to NGT order OA 222/2014 dated 4.5.2016 | Tertiary nala is passing through northern side of the project site and leaving 25m buffer from the edge of nala to building line as per the NGT order. Village map is enclosed as <b>Annexure-20</b><br><br>There is no kharab land in 26.38 Acres of area as per the RTC records. Summary of RTC documents towards proposed project is mentioned below. <table><tr><td>Survey Nos.</td><td>Area</td><td>As per conversion &amp; RTC</td></tr><tr><td>69/1</td><td>8 Acres 28 Guntas</td><td>No karab land</td></tr><tr><td>69/2</td><td>3 Acres 00 Guntas</td><td>No karab land</td></tr><tr><td>69/3</td><td>6 Acres 03 Guntas</td><td>No karab land</td></tr><tr><td>69/4</td><td>6 Acres 04 Guntas</td><td>No karab land</td></tr><tr><td>171/1 as 171</td><td>1 Acres 11 Guntas</td><td>6 Guntas for high tension wire line<br/>3.08 Guntas for Road</td></tr><tr><td>171/2 as 171</td><td>1 Acres 9.08 Guntas</td><td>1 Acres 4.08 Guntas for residential<br/>5 Guntas for park</td></tr></table><br><br>RTC documents towards proposed project are enclosed as <b>Annexure-4</b> |  |                                   |                             | Survey Nos. | Area | As per conversion & RTC | 69/1 | 8 Acres 28 Guntas | No karab land | 69/2 | 3 Acres 00 Guntas | No karab land | 69/3 | 6 Acres 03 Guntas | No karab land | 69/4 | 6 Acres 04 Guntas | No karab land | 171/1 as 171 | 1 Acres 11 Guntas | 6 Guntas for high tension wire line<br>3.08 Guntas for Road | 171/2 as 171 | 1 Acres 9.08 Guntas | 1 Acres 4.08 Guntas for residential<br>5 Guntas for park |
| Survey Nos.  | Area                                                                                                                                                                                                                                              | As per conversion & RTC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |                                   |                             |             |      |                         |      |                   |               |      |                   |               |      |                   |               |      |                   |               |              |                   |                                                             |              |                     |                                                          |
| 69/1         | 8 Acres 28 Guntas                                                                                                                                                                                                                                 | No karab land                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                   |                             |             |      |                         |      |                   |               |      |                   |               |      |                   |               |      |                   |               |              |                   |                                                             |              |                     |                                                          |
| 69/2         | 3 Acres 00 Guntas                                                                                                                                                                                                                                 | No karab land                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                   |                             |             |      |                         |      |                   |               |      |                   |               |      |                   |               |      |                   |               |              |                   |                                                             |              |                     |                                                          |
| 69/3         | 6 Acres 03 Guntas                                                                                                                                                                                                                                 | No karab land                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                   |                             |             |      |                         |      |                   |               |      |                   |               |      |                   |               |      |                   |               |              |                   |                                                             |              |                     |                                                          |
| 69/4         | 6 Acres 04 Guntas                                                                                                                                                                                                                                 | No karab land                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                   |                             |             |      |                         |      |                   |               |      |                   |               |      |                   |               |      |                   |               |              |                   |                                                             |              |                     |                                                          |
| 171/1 as 171 | 1 Acres 11 Guntas                                                                                                                                                                                                                                 | 6 Guntas for high tension wire line<br>3.08 Guntas for Road                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |                                   |                             |             |      |                         |      |                   |               |      |                   |               |      |                   |               |      |                   |               |              |                   |                                                             |              |                     |                                                          |
| 171/2 as 171 | 1 Acres 9.08 Guntas                                                                                                                                                                                                                               | 1 Acres 4.08 Guntas for residential<br>5 Guntas for park                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |                                   |                             |             |      |                         |      |                   |               |      |                   |               |      |                   |               |      |                   |               |              |                   |                                                             |              |                     |                                                          |
| 4.           | Explore the possibility of alternate source for water other than tankers and bore wells                                                                                                                                                           | Bore well water is the major source of water for drinking purpose for the proposed project. Hence There is no alternative source of water.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |                                   |                             |             |      |                         |      |                   |               |      |                   |               |      |                   |               |      |                   |               |              |                   |                                                             |              |                     |                                                          |
| 5.           | Scientific assessment of the availability of the water from the bore well in the project site                                                                                                                                                     | Scientific assessment of water from borewell has been carried out and the copy of report is enclosed as <b>Annexure-7</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |                                   |                             |             |      |                         |      |                   |               |      |                   |               |      |                   |               |      |                   |               |              |                   |                                                             |              |                     |                                                          |

## TERMS OF REFERENCE (TOR)

|     |                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     |                                                                                                                                                                                     | Based on the report, the required quantity of water is available from proposed bore wells will be used during operation phase within the project site.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 6.  | Revised water balance calculating fresh water demand at the rate of 55LPCD as per the norms prescribed for rural water supply and the scheme for meeting the additional requirement | <p>Details are incorporated in chapter-2 of Page No. 24</p> <ul style="list-style-type: none"> <li>➤ Total water requirement to be considered as per NBC is 135 LPCD</li> <li>➤ Domestic water demand (70% of total consumption) = <math>135 \times 0.7 = 90</math> LPCD</li> <li>➤ Flushing water demand (30% of total consumption) = <math>135 \times 0.3 = 45</math> LPCD</li> <li>➤ Reduction by 30% in domestic water consumption due to use of water efficient Sanitary Fixtures = <math>90 \times 0.7 = 60</math> LPCD.</li> </ul> <p>Details of water efficient fixtures towards proposed project are enclosed as <b>Annexure-21</b></p> |
| 7.  | Scheme for treating sewage and sullage separately and use of treated water within the project site                                                                                  | <p>Provision for separate piping system will be provided for the treatment of sewage and sullage. Generated sewage will be treated in STP of capacity 1300 KLD by SBR technology. STP feasibility report is enclosed as <b>Annexure-8</b></p> <p>STP treated water will be used for flushing, landscaping, car and floor washing purpose</p>                                                                                                                                                                                                                                                                                                     |
| 8.  | Quantification of the terrace area available for harnessing solar energy and an appropriate plan thereof with due calculations                                                      | <p>Terrace area available for the generation of solar power is 1,348 Sqmt. Onsite roof top solar power generation which is planned by considering usable terrace areas after area provision for fire tanks, services, parapet shadow area, etc. Terrace plan for harnessing solar energy is enclosed as <b>Annexure-22.</b></p>                                                                                                                                                                                                                                                                                                                  |
| 9.  | Scheme for providing dual fuel generators for backup power with provision for CNG                                                                                                   | In the proposed project there is no provision of CNG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 10. | Scheme for utilization of entire Rain water harvested in the project site (both from the roof top and from the surface runoff) within the project premises only                     | <ul style="list-style-type: none"> <li>➤ Roof rain water will be collected in roof rain water collection tank of capacity <math>2 \times 160</math> cum and same will be utilized after prior treatment.</li> <li>➤ 93 no's of recharge pits will be provided to recharge the ground water within the site.</li> </ul>                                                                                                                                                                                                                                                                                                                           |

## TERMS OF REFERENCE (TOR)

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|     |                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11. | Details of excavated earth and plan for safe and scientific utilization of the same within the project site                                                                        | Excavated top soil will be stored for reusing for landscaping. During the excavation, the surrounding area will be kept wet, so that there is no dust pollution in the air. Total quantity of excavation from the proposed project is 47,247.38 Cum. The quantity of excavated earth generated from the activity is proposed to reuse within the project site for backfilling in towers and row house. Details of excavation is incorporated in chapter-4 of Page No. 76 |
| 12. | Hydrological study of the area influencing the surface water flow considering the micro watershed network of the region with respect to adequacy of the nala and carrying capacity | Hydrological study report is enclosed as <b>Annexure-23</b>                                                                                                                                                                                                                                                                                                                                                                                                              |

## **EXECUTIVE SUMMARY**

### **1. PREAMBLE**

M/s. APG Intelli Homes Private limited earlier had obtained Environmental Clearance (EC) dated 16.02.2016 vide File No. SEIAA:87:CON:2015 from State Environment Impact Assessment Authority (SEIAA), Karnataka for the construction of residential apartment "*Assetz Lifestyle 63° East*", which is located at Survey No's 69/1, 69/2, 69/3 of Kodathi Village, Varthur Hobli, Bengaluru East Taluk, Bengaluru District for developing on a total plot area of 71,932 Sqmt (17.77 Acres) with total built-up area 1,29,147.98 Sqmt having 960 numbers of residential units including EWS units, in three towers which includes, Tower-B with Ground+14 upper floors, Tower-C with Basement+Ground+14 upper floors and Tower-D with Ground+14 upper floors.

As per the BDA requirement and due to the sloping ground profile, the lowermost floor of Tower-D which is open on one side was termed as ground floor, the same has been renamed as Basement.

We have received BDA approved plan for Tower-D as Basement+ Ground+ 13 upper floors is enclosed as **Annexure-18**. In this regards, applied letter to issue the corrigendum to the above stated EC on 18.4.2017 is enclosed as **Annexure-18**.

Based on the approval obtained, construction of Tower-C has been started.

### **2. CURRENT PROPOSAL**

In the meanwhile, the management of the company decided to take up further expansion with inclusion of Tower-A, E & F and row houses with addition of built up area from 1,29,147.98 Sqmt to 2,82,974.72 Sqmt in addition to the earlier Tower-B, C, D. The project was planned to undertake modification in Tower-B by increasing number of units which also changes in built up area.

Now, project required Environmental Clearance under Modification and Expansion (including existing & proposal) for the above said project consisting of six towers of residential apartment and Row house with max height of 59.9m at Survey No's 69/1, 69/2, 69/3, 69/4 and 171 of Kodathi Village, Varthur Hobli, Bengaluru East

Taluk, Bengaluru District of total extent of land is measuring about 1,06,786.42 Sqmt (26.38 Acres).

Due to change in the plan, project attracts EIA studies due to increase of built up area from 1,29,147.98 Sqmt to 2,82,974.72 Sqmt. The project is falling under 'B1' category of EIA Notification - 2006 and its subsequent since built up area of the project crossing more than 1, 50,000 Sqmt and is considered under 8(b) category of the said notification under Township & Area Development projects.

As per the requirements of the notification, an application was submitted to SEIAA, Karnataka on 10<sup>th</sup> April, 2017 along with Form-1, Form-1A and proposed Terms of Reference (TOR). Based on the information furnished and presentation done before the State Expert Appraisal Committee (SEAC) members, proposal was appraised in the 181<sup>th</sup> State Expert Appraisal Committee (SEAC) meeting, held on 20<sup>th</sup> April, 2017. Subsequently Authority has issued the TOR (Terms of Reference) for preparing Environmental Impact Assessment (EIA) report vide letter No. SEIAA 60 IND 2017 dated on 28<sup>th</sup> April, 2017.

### **3. PROJECT DESCRIPTION**

*"Assetz Lifestyle 63° EAST"*- Modification and expansion of proposed residential development which is measuring about 1,06,786.42 Sqmt (26.38 Acres) located at Survey No's. 69/1, 69/2, 69/3, 69/4 & 171 of Kodathi Village, Varthur Hobli, Bengaluru East Taluk, Bengaluru District, Karnataka. The proposed project provides a luxurious residential apartment with modern amenities and comfortable living for the occupants.

The project is located in the co-ordinates of Latitude - 12°53'11.3" N, Longitude - 77°42'17.2" E. As per the Revised Master Plan of CDP-2015, the project site is a designated as Residential Zone. Total extent of land is measuring about 1,06,786.42 Sqmt (26.38 Acres) having built up area of 2,82,974.72 Sqmt. Ground coverage area achieved is i.e 33.2% & allowable is 55%. Achieved FAR is 2.18, permissible FAR is 2.25.

The proposed project consisting of total 1,929 Nos. of residential units including EWS units in six tower and row houses with a maximum height of the building is 59.9m. Building configurations explained below.

| Description          | Building configuration | Height | Units        | EWS        |
|----------------------|------------------------|--------|--------------|------------|
| Tower -A             | G+14 floors            | 44.9   | 310          | 2          |
| Tower -B             | G+14 floors            | 44.9   | 286          | 39         |
| Tower -C             | B+G+14 floors          | 44.9   | 252          | 84         |
| Tower -D             | B+G+13 floors          | 44.9   | 312          | --         |
| Tower -E             | B+G+19 floors          | 59.9   | 418          | 57         |
| Tower -F             | B+G+14 floors          | 44.85  | 90           | --         |
| Row houses           | G+3 floors             | 12.0   | 79           | --         |
| <b>Total - 1,929</b> |                        |        | <b>1,747</b> | <b>182</b> |

Details of land use within the project site is given in below table,

| Description of usage                              | Area in Sqmt | %usage |
|---------------------------------------------------|--------------|--------|
| Total site area                                   | 1,06,786.42  | --     |
| Civic amenities                                   | 6,697.28     | 6.27%  |
| Net site area for development                     | 1,00,089.14  | 100    |
|                                                   |              |        |
| Ground coverage area                              | 33,229.18    | 33.2   |
| Driveway/ hardscape area                          | 22,738.95    | 22.72  |
| Landscape area<br>(including park and open space) | 39,006.55    | 38.98  |
| Service area                                      | 1,014.46     | 1.01   |
| Surface parking area                              | 4,100.00     | 4.09   |

The total water requirement during construction phase for construction activities is 25 KLD and for domestic consumption for construction laborers is 9 KLD met through private water tankers. The total power required during this phase is 200 KVA sourced from BESCOM and as part of back-up power supply 1x 50KVA DG sets will be installed. The total construction period is 5 years and approximately 200 laborers are employed.

The quantity of solid waste generated during the construction phase is 40Kg/day and the same is being handed over to local body after segregation for further processing. Excavated earth of about 47,247.38 Cum for all towers and the total



quantity of construction debris of 300 Cum will be reused for various project activities within the site.

Water requirement for the project is proposed to be met by the Bore well as drinking water. Total water consumption is 1238 KLD (Fresh water + recycling water). The total wastewater discharge from the project is 1115KLD, which will be routed to the Sewage Treatment Plant to treat the sewage up to urban reuse standards using existing STP of capacity of 1300 KLD using Sequencing Batch Reactor (SBR) Technology. Fresh water demand is reduced up-to 30 lpcd by installing water efficient fixtures.

Traffic Management Plan has been proposed for construction as well as for operation phase, total parking space provided for 2,180 Nos. of cars. Rain water harvesting plan is proposed with Roof Rain Water collection Sump with capacities of 2×160 cum and 93 nos. of recharge pits to recharge the ground water.

Power requirement for the project is 11,267 kW will be drawn from BESCOM. Transformer center of 1×630KVA, 2×500KVA, 8×1000KVA capacities will be installed. Diesel engine driven generators of 2×380KVA, 11×500KVA will be used as a source of backup power. The proposed project encompasses the usage of non-conventional energy source i.e. use of solar energy. The overall energy savings from the proposed project is around 21%.

Proposal for scientific handling of solid waste, e-waste & hazardous waste will be examined and adequate safeguard will be proposed. Organic waste converter will be proposed to convert garbage into compost of about 2.1 MT/day & the generated inorganic waste will be given to the waste collectors for recycling for further processing of amount 2.1 MT/day. Sludge from STP will be around 56 Kg/day will be used as manure for in-house landscaping.

The project planning includes extensive plantations along the site periphery and also professionally designed landscape and greenery which includes plantations of native or adapted trees and plants. The construction period of the proposed tower will be about 60 months. The total investment cost involved in setting up of the project is estimated to be about Rs. 457Crores.

| Sl. No.      | Details           | Description of Item       | Cost in Rs.           |
|--------------|-------------------|---------------------------|-----------------------|
| 1            | Earlier           | Land & Construction cost, | 300, 00, 00,000       |
| 2            | Present expansion | Plant & machinery         | 157, 00, 00,000       |
| <b>TOTAL</b> |                   |                           | <b>Rs. 457 Crores</b> |

#### **4. DESCRIPTION OF THE ENVIRONMENT**

For the preparation of EIA, baseline study has been carried out as per the generic structure provided in the Appendix III of the EIA notification 2006 of MoEF & as per the EIA GUIDANCE MANUAL for Building, Construction, Township and Area Developmental Projects prepared by Administrative Staff College of India, Hyderabad dated February 2010 and as per the CPCB standard references.

Baseline study was conducted in the summer season during the month of April to June 2017, for an area covering 10km radius with project site as center. Secondary data/ Micrometeorological data have been collected from IMD, Bengaluru to assess the base line environmental status. Collection & analysis of baseline environmental data have been done on ambient air quality, noise quality, surface & ground water quality attributes.

In addition to the baseline environmental monitoring, field inspection in the study area, collection of secondary information for the environmental components and discussion with the officials and local public were also conducted.

A total of nine samples were collected from the study area. The samples have been analyzed for physio-chemical parameters. At the above mentioned sites, two kg of soil samples were collected by means of augur, filled in polythene bags and sent to the laboratory for analysis. The soil samples were collected at a depth of 10-15 cm (top soil).

Secondary information on meteorological conditions for the project study region was collected from the IMD station at Bangalore. Wind rose diagram shows that during the study period, average wind speed of 7.6km/hr was observed. Wind direction is also studied during different time of the day, during the study period, indicate that maximum windblown was from North East direction. Down wind direction is South West.

Ambient air quality monitoring (AAQM) was carried at nine locations. The result of AAQM reveals that, measured values for PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, NO<sub>2</sub>, CO are well within the NAAQ, 2009 standards. This indicates that the ambient air quality of the study area is satisfactory in nature. Ambient noise levels monitoring was carried at nine locations and results were found to be within the CPCB standards.

The results of hydro geological surveys reveal that, the phreatic aquifers are totally absent in the area. Ground water development in the area is through bore wells, ranging in depth from 50 – 200 m. Depth to water level range from 17.13 to 78.85 mbgl. Water levels of more than 80 mbgl are noticed in few isolated patches around Kodathi. Discharges of the bore wells range from 1,500 – 20,000 liters per hour sustaining pumping of more than 8 hours per day. High yielding bore wells of more than 20,000 liters are uncommon in the area. The potential water bearing zones are located as isolated patches along the nala courses and near the surface water bodies.

From the reconnaissance survey information on flora and fauna in the study area and project site was collected. Further, conservation status of the same were evaluated referring to IUCN website & Red Data Books of the Botanical Survey of India. Information on various groups of animal species found in the study area was collected by both direct and indirect observations. Later, by using IUCN Red List/ Wildlife (Protection) Act, 1972 Schedules was referred to know their conservation status.

The project site has luxurious tree growth on the portion of land in which retained 291 trees in the project site and the project authorities as much as possible avoid felling of trees. The trees, shrubs, herbs found at the site are common and native to the region. There are no rare, endangered, threatened species found in the study area and also at site. It was noticed during the site visit at tower-C that, top soil was stored separately and using it for green belt development.

**5. ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURE****Land Environment:**

During construction phase, site clearing activities and formation of approach roads will lead to air pollution due to dust and also cause minor secondary impact such as decreasing the water infiltration, loosening of soil. To mitigate the same, water sprinkling will be undertaken to reduce fugitive load and measures such as reuse of excavated top soil for greenery development, slope stabilization and construction of embankments, balanced cut and fill operations will be undertaken for effective area development.

During operation phase, if the sewage is not properly treated to the discharge norms of KSPCB and if used for greenery development or due to over usage will result in filthy/unaesthetic/odour nuisance conditions and indirectly affects soil and ground water of the region. Hence, to mitigate the above impacts, the sewage will be treated in scientifically designed STP that enables to treat in compliance to KSPCB discharge standards for secondary reuse applications.

**Air Environment:**

Site clearing, excavation work, transportation of raw materials, emissions from construction vehicles, etc., will result in generation of dust. Ambient air quality impacts from emissions during construction of the project are estimated using air quality dispersion modeling analysis. The modeling analysis considers the construction site location and the sources of emissions during construction, including vehicle and equipment exhaust and fugitive dust.

As part of the mitigation measures, periodic water sprinkling will be carried out in all the dust generating activities like site clearing, leveling, excavation, material handling, etc. to suppress the dust. Also, vehicles delivering loose and fine materials like sand and fine aggregates will be covered with tarpaulin to reduce spills on the roads and also to reduce fugitive emissions.

During operation phase of the project, the source of emission will be from DG sets, will be used as a backup power only during power failure and vehicular emissions.

As part of the mitigation measures, height of the Stacks/chimneys to D.G. Set as per KSPCB norms will be restricted to minimum 15m AGL for effective dispersion of pollutants into atmosphere with HSD with sulphur content of <0.05%. Further trained security will take care of smooth entry/exit of vehicles to avoid traffic congestion within and near entry/exit. As advisory in nature, instructions will be displayed to the residents of the projects to undergo their vehicles for pollution control check time to time, which is also a mandatory under the Moto Vehicles Act, 1988.

**Noise Levels:** During construction phase, various sources of noise pollution will be mainly from operation of machineries like compactors, concrete plant, cranes, batch plants, material lifting operations, communication noise, DG sets, honking etc.,

As part of the mitigation measures, barricades will be erected all along the site boundary to avoid noise nuisance on the surrounding population, acoustic enclosures to DG sets will be ensured & trained security will be deployed for smooth entry/exit in & around the construction sites/blocks which also helps in reducing unnecessary honking. As a health measure, Ear plugs will be provided to the workers exposed to high noise prone activities.

#### **Surface and Ground Water Quality:**

During Construction phase, impacts are anticipated through disposal of sewage generated from the labour in the site if not managed properly. Also, improper treatment of sewage from labour in the site leads to infiltration into the subsurface soil and finally affects the ground water of the region. As part of the mitigation measures, sewage from the labour in the site is being discharged to septic tank designed & implemented as per the guidelines.

During operation phase, if the sewage is not properly treated to the discharge norms of KSPCB and used for greenery development or due to over application will result in filthy/unaesthetic/odour nuisance conditions and indirectly affects soil and ground water of the region. To mitigate the above impact, the sewage from the proposed project will be collected through an internal network of sewerage system and discharged into the STP of capacity 1300 KLD and treatment method is based on

sequential Batch Reactor Technology. Treated wastewater will be reused for greenery development, toilet flushing, car washing, within the site premises and excess water will be used for public park maintenance.

**Solid and Hazardous Waste Management:**

During Construction Phase, improper management of solid waste generated from the labour in the site leads to leachate formation under moisture conditions or when layers comes in contact with water will affect groundwater through percolation of leachate into subsurface soil. Improper disposal of construction debris, used oil from DG sets and biomedical waste will result in causing ground water contamination and chances of spread of infectious diseases and increased health risks to labour force. As part of the mitigation measure, solid waste generated from labour in the site will be collected in separate bins and dispose to BBMP trucks.

Nearly 47,247.38 Cum of excavated earth & 300 cum of construction debris will be reused for various purposes within the site. Also, used oil/waste oil generated from DG sets & biomedical wastes will be collected/ stored in leak proof drums/barrels/bins and disposed to the KSPCB authorized reproprocessors/recyclers.

During operation phase: Solid Waste - Domestic solid waste from the proposed residential project will 4.2MT/day. If this quantum of solid waste is not handled scientifically and disposed improperly will result in leachate formation and affects the ground water through percolation of leachate into subsurface soil. Out of which, organic wastes contributes to 50% i.e., 2.1MT/day will be composted using organic waste converters and compost will be reused within the project site & excess will be sold in the market and inorganic wastes contribute around 50% i.e, 2.1MT/day will be handed over to authorized recycle. Apart from the above, 56Kg/day of STP sludge will be dewatered and reused as manure within the project site.

Hazardous waste from the proposed residential project, the hazardous waste namely used oil from DG Sets maintenance and household hazardous waste of about will be collected in leak proof barrels/drums/containers and disposed to KSPCB approved reproprocessors/agencies.

Biomedical waste and E-waste is expected from to the project. Bio Medical wastes will be segregated in different colored Bins as per BMW Rules, 1998 & E-wastes will be segregated as per size and accordingly stored in closed rooms and finally disposed to KSPCB authorized/ approved agencies.

**Ecology and Biodiversity:**

Construction Phase - No protected areas, eco sensitive areas, etc are present within 5km of the project site. Impact on biological environment (flora and fauna) will be anticipated due to changes occurring on air, water and land environment. Impacts that are anticipated during construction phase on biological environment are due to clearing of vegetation, transportation of raw materials, disposal of raw materials and generation of noise from construction activities.

Operation Phase - No major impacts will be anticipated during operation phase of the project on biological environment. However, with the development of greenery within the project with various indigenous species (flowering, fruit bearing) will attract many birds, butterflies, etc. Maintenance of greenery will be undertaken throughout the year.

**Socio-economics:**

During construction period, socio-economic impacts are identified as

- Health impact due to dust, noise, improper sanitation during construction activities. Same will be mitigated through proper implementation of EMP.
- Generation of employment will benefit the local population. More than 200 labours including technical staff, workers etc will get employment
- Increase in commercial activities: Many small shops/vendors can offer their services to construction workers and people visiting the project site.
- Since, traffic density is very thin in the surrounding road network, therefore the increased traffic on the main road to the project will be very easily absorbed. Proper maintenance of construction vehicles will minimize health impacts due to noise, dust, emissions.



During operation phase, socio-economic impacts are identified as

- Health impact due to dust, noise, improper sanitation during operation phase. Same will be mitigated through proper implementation of EMP for operation phase.
- Generation of employment will benefit the local population. More than 100 persons will get employment for day to day maintenance activities in the project.
- Increase in commercial activities: Many small/medium/large shops/vendors can offer their services to residents/occupants of the project.
- Since, traffic density is very thin in the surrounding road network, therefore the increased traffic on the main road to the project will be very easily absorbed. More than sufficient parking will be provided, therefore no piling of vehicles near the entry/exit.

Overall evaluation of impacts on various environmental parameters indicates that, during construction phase without mitigation measures there will be a significant impacts and if suggested mitigation measures will be implemented, the impacts will be very minor in nature. Similarly, during operation phase, without mitigation measures, there will be a significant impacts and if suggested mitigation & management measures will be implemented, the impacts will be minor in nature.

## 6. ENVIRONMENTAL MONITORING PROGRAMME

### Monitoring Schedule for Environmental Parameters

| Sl. No.   | Particulars                         | Monitoring frequency | Duration of monitoring | Important parameters for monitoring                                                                                                                           |
|-----------|-------------------------------------|----------------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>I.</b> | <b>Air Quality</b>                  |                      |                        |                                                                                                                                                               |
| 1.        | Ambient Air monitoring              |                      |                        |                                                                                                                                                               |
|           | Project premises                    | Once in a month      | 24 hourly sample       | PM <sub>2.5</sub> , PM <sub>10</sub> , SO <sub>2</sub> , NO <sub>2</sub> , Ozone, lead, Carbon Monoxide, Ammonia, Benzene, Benzo (a) Pyrene, Arsenic, Nickel. |
| 2.        | Stack Monitoring                    | Once in a month      | Grab                   | SO <sub>2</sub> , SPM, NO <sub>x</sub> , HC & CO                                                                                                              |
| <b>II</b> | <b>Water and Wastewater Quality</b> |                      |                        |                                                                                                                                                               |
| 1.        | Water Quality                       |                      |                        |                                                                                                                                                               |



|            |                                                                                                        |                 |                    |                           |
|------------|--------------------------------------------------------------------------------------------------------|-----------------|--------------------|---------------------------|
| i.         | Ground water at two locations (up-gradient and down-gradient) of treated effluent discharge area/ land | Once in a month | Grab               | As per KSPCB requirements |
| 2.         | Wastewater quality                                                                                     |                 |                    |                           |
| i.         | Inlet to STP                                                                                           | Daily           | Composite          | -                         |
| ii.        | Treated effluent prior to discharge                                                                    | Daily           | Composite          | -                         |
| <b>III</b> | <b>Soil Quality</b>                                                                                    |                 |                    |                           |
| 1.         | Within project premises at 1 location on effluent discharging area / land                              | Once in a month | Composite Sample   | As per KSPCB requirements |
| 2.         | Ecological preservation and up-gradation                                                               | Seasonal        | Visual observation | Survival rate             |
| <b>IV</b>  | <b>Noise Monitoring</b>                                                                                |                 |                    |                           |
| 1.         | Project premises                                                                                       | Once in a month | Day and Night      | As per KSPCB requirements |

## **7. ALTERNATIVE TECHNOLOGIES AND SPECIFIC STUDIES**

Following are the specific studies carried out with respect to the proposed project which are as follows:

- Transportation (Traffic studies and Management measures)
- Building material and technologies
- Energy conservation analysis

## **8. PROJECT BENEFITS**

- Generation of employment will benefit the local population. More than 200 construction labours including technical staff, workers etc will get employment
- More than 100 persons will get employment during operation phase for day to day maintenance activities in the project. Approximately 500 maids will get job for their lively hood
- Development of greenery within the project with various indigenous species (flowering, fruit bearing) will attract many birds, butterflies, etc
- Eco friendly handling of domestic solid waste, resulting in the organic manure, therefore minimizing the dependency on inorganic fertilizers.
- Excess organic manure can be given to nearby farmers/ agricultural lands.

- Conservation of water by utilizing the treated wastewater for urban secondary reuse applications in the project.

## **9. ENVIRONMENTAL MANAGEMENT PLAN**

During construction, as part of the EMP, erection of barricades around the periphery, water sprinkling, sewage management through septic tanks and soak pit, storm water management through drainage arrangements, traffic management, scientific management of solid waste, hazardous waste, bio medical waste and e-waste measures will be undertaken towards better implementation of the project.

During operation phase, use of STPs, organic waste converters, energy conservation features, rain water harvesting and recharging, scientific disposal of hazardous waste, bio medical waste and e-waste, greenery development and corporate social activities around the project site will benefit the environment.

The total cost of implementing above EMP works out to Rs. 919.5 Lakhs. The operational cost of the same is estimated to be Rs. 21 Lakhs per month.

Overall, the project will have minimum impact on the environment, if the recommended/ suggested various environmental mitigation & management measures as stated in this report are implemented by the project proponents in spirit.

**COMPARITIVE STATEMENT OF EARLIER ENVIRONMENTAL CLEARANCE (EC)**  
**OBTAINED AND PRESENT PROPOSAL**

| S. No. | Features            | Unit     | EC Obtained                                                                                                 | Present Proposal                                                                                                      |             |                        |        |       |     |
|--------|---------------------|----------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------|------------------------|--------|-------|-----|
| 1.     | Subject number      | File No. | SEIAA:87:CON:2015                                                                                           | SEIAA:60:CON:2017                                                                                                     |             |                        |        |       |     |
| 2.     | Project Name        | --       | Assetz Life Style 63° East                                                                                  | Assetz Lifestyle 63° East                                                                                             |             |                        |        |       |     |
| 3.     | Developer           | --       | M/s. APG Intelli Homes Private limited                                                                      | M/s. APG Intelli Homes Private limited                                                                                |             |                        |        |       |     |
| 4.     | Type of Development | --       | Residential Apartment                                                                                       | Residential Apartment and Row houses                                                                                  |             |                        |        |       |     |
| 5.     | Project address     | --       | Survey No's. 69/1, 69/2, & 69/3 of Kodathi Village, Varthur Hobli, Bengaluru East Taluk, Bengaluru District | Survey No's. 69/1, 69/2, 69/3, 69/4 & 171 of Kodathi Village, Varthur Hobli, Bengaluru East Taluk, Bengaluru District |             |                        |        |       |     |
| 6.     | Plot Area           | Sqmt     | 71,932 (17.77 Acres)                                                                                        | 1,06,786.42 Sqmt (26.38 Acres)                                                                                        |             |                        |        |       |     |
| 7.     | Gross Built Up Area | Sqmt     | 1,29,147.98 Sqmt                                                                                            | 2,82,974.72 Sqmt                                                                                                      |             |                        |        |       |     |
| 8.     | Landscape area      | Sqmt     | 41,893.6                                                                                                    | 39,006.55 (38.98%)                                                                                                    |             |                        |        |       |     |
| 9.     | Number of units     | Nos.     | 960                                                                                                         | 1,929 including EWS units                                                                                             |             |                        |        |       |     |
| 10.    | Building Floors     |          | Tower-B: G+14 floors<br>Tower-C: B+G+14 floors<br>Tower-D: G+14 floors                                      | S. No                                                                                                                 | Description | Building configuration | Height | Units | EWS |
|        |                     |          |                                                                                                             | 1                                                                                                                     | Tower -A    | G+14 floors            | 44.9   | 310   | 2   |
|        |                     |          |                                                                                                             | 2                                                                                                                     | Tower -B    | G+14 floors            | 44.9   | 286   | 39  |
|        |                     |          |                                                                                                             | 3                                                                                                                     | Tower -C    | B+G+14 floors          | 44.9   | 252   | 84  |
|        |                     |          |                                                                                                             | 4                                                                                                                     | Tower -D    | B+G+13 floors          | 44.9   | 312   | --  |
|        |                     |          |                                                                                                             | 5                                                                                                                     | Tower -E    | B+G+19 floors          | 59.9   | 418   | 57  |
|        |                     |          |                                                                                                             | 6                                                                                                                     | Tower -F    | B+G+14 floors          | 44.85  | 90    | --  |

|     |                                          |        |                                     | 7                                     | Row house | G+3 floors | 11.85 | 79    | --  |
|-----|------------------------------------------|--------|-------------------------------------|---------------------------------------|-----------|------------|-------|-------|-----|
|     |                                          |        |                                     | Total - 1,929                         |           |            |       | 1,747 | 182 |
| 11. | Water requirement                        | KLD    | 447 (Fresh water + Recycling water) | 1,238 (Fresh water + Recycling water) |           |            |       |       |     |
| 12. | Source of water                          | --     | Borewell/Tankers                    | Bore well                             |           |            |       |       |     |
| 13. | Wastewater generation                    | KLD    | 402                                 | 1,115                                 |           |            |       |       |     |
| 14. | STP capacity                             | KLD    | 405                                 | 1,300                                 |           |            |       |       |     |
| 15. | Solid Waste                              | Kg/day | 1,790                               | 4.2 MT/day                            |           |            |       |       |     |
| 16. | Power requirement                        | KVA    | 3,781                               | 11,267 kW                             |           |            |       |       |     |
| 17. | Power Source                             | --     | BESCOM                              | BESCOM                                |           |            |       |       |     |
| 18. | Backup power (DG sets)                   | KVA    | 5×500 KVA                           | 2×380KVA, 11×500KVA                   |           |            |       |       |     |
| 19. | Car Parking facilities                   | PCU    | 967                                 | 2,180                                 |           |            |       |       |     |
| 20. | Roof rain water collection tank capacity | Cum    | 150                                 | 2×160cum                              |           |            |       |       |     |
| 21. | Recharge pits                            | Nos.   | 70                                  | 93                                    |           |            |       |       |     |
| 22. | Project cost                             | Rs.    | 300 Crores                          | 457 Crores                            |           |            |       |       |     |

**PROJECT AT A GLANCE**

|     |                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                  |
|-----|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| 1.  | Project name                                     | <b><i>“Assetz Lifestyle 63° EAST”</i></b>                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                  |
| 2.  | Project type                                     | <i>Modification &amp; Expansion of Residential Apartment</i>                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                  |
| 3.  | Name & contact address of the project proponents | <i>Mr. Arun G Rao, Head – Engineering<br/>M/s. APG Intelli Homes Private limited,<br/>Assetz Property Group, Ground floor, Embassy Icon,<br/>3 Infantry Road, Bengaluru-560001</i>                                                                                                                                                                                                                                                            |                                                                                  |
| 4.  | Objective of the project                         | <i>To provide a luxurious Residential apartment with modern amenities and comfortable living.</i>                                                                                                                                                                                                                                                                                                                                             |                                                                                  |
| 5.  | Project description                              | <i>Environmental Clearance of vide No. SEIAA: 87 CON 2015 dated 16.2.2016 from SEIAA, Karnataka has been obtained for built up area of 1,29,147.98 Sqmt consists of 960 number of residential units.<br/>Requires EC under modification and expansion for total built-up area is 2,82,974.72 Sqmt consisting of six towers of residential apartment and Row house with max height of 59.9m. Total number of units is 1,929 including EWS.</i> |                                                                                  |
| 6.  | Project location                                 | <i>At Survey No's. 69/1, 69/2, 69/3, 69/4 &amp; 171 of Kodathi Village, Varthur Hobli, Bengaluru East Taluk, Bengaluru District.</i>                                                                                                                                                                                                                                                                                                          |                                                                                  |
|     | Latitude of the project site                     | <i>12° 53' 11.3" N</i>                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                  |
|     | Longitude of the project site                    | <i>77° 42' 17.2" E</i>                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                  |
| 7.  | Estimated cost of the project                    | <i>Rs 457 Crores</i>                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                  |
| 8.  | Total site area                                  | <i>1,06,786.42 Sqmt (26.38 Acres)</i>                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                  |
| 9.  | Total Built-up area                              | <i>EC obtained for an BUA of</i>                                                                                                                                                                                                                                                                                                                                                                                                              | <i>3 Towers of B, C &amp; D = 1,29,147.98 Sqmt</i>                               |
|     |                                                  | <i>EC required for an Expansion of</i>                                                                                                                                                                                                                                                                                                                                                                                                        | <i>3 Towers of E, F &amp; A, Row house = 1,53,826.74 Sqmt</i>                    |
|     |                                                  | <b><i>EC required for total built up area by considering existing &amp; proposed buildings</i></b>                                                                                                                                                                                                                                                                                                                                            | <b><i>Built up area of 2,82,974.72 Sqmt with total number of 1,929 units</i></b> |
| 10. | Total ground coverage area                       | <i>33,229.18 Sqmt (33.2%)</i>                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                  |
| 11. | Total landscaping area                           | <i>39,006.55 Sqmt (38.98%)</i>                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                  |
| 12. | Height of the building                           | <i>59.9 m. (maximum)</i>                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                  |
| 13. | Status of the project                            | <i>Based on the approval obtained, construction of Tower-C has been started.</i>                                                                                                                                                                                                                                                                                                                                                              |                                                                                  |
| 14. | Green Building Rating                            | <i>Pre-certified Gold from Indian Green Building Council (IGBC)</i>                                                                                                                                                                                                                                                                                                                                                                           |                                                                                  |

|                                                         |                                                                         |                   |                                                                                                                                     |
|---------------------------------------------------------|-------------------------------------------------------------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| 15.                                                     | Ground coverage                                                         |                   | 33.2% (permissible = 55%)                                                                                                           |
| 16.                                                     | FAR achieved                                                            |                   | 2.18 (permissible = 2.25)                                                                                                           |
| <b><u>Resource Requirements: Construction Phase</u></b> |                                                                         |                   |                                                                                                                                     |
| 17.                                                     | Total manpower required                                                 |                   | 200 Nos.                                                                                                                            |
| 18.                                                     | Power requirement                                                       |                   | 200 kVA                                                                                                                             |
| 19.                                                     | Water requirement for construction activities                           |                   | 25 KLD                                                                                                                              |
| 20.                                                     | Domestic water requirement during construction                          |                   | 9 KLD                                                                                                                               |
| 21.                                                     | Source of water for construction                                        |                   | External authorized tanker water suppliers                                                                                          |
| <b><u>Resource Requirements: Operation Phase</u></b>    |                                                                         |                   |                                                                                                                                     |
| 22.                                                     | Total number of occupants                                               |                   | 10,847 numbers of residents                                                                                                         |
| 23.                                                     | Electrical details                                                      | Source            | Power requirement is sourced from BESCOM                                                                                            |
|                                                         |                                                                         | Power requirement | 11,267 kW                                                                                                                           |
|                                                         |                                                                         | Transformers      | 1×630KVA, 2×500KVA, 8×1000KVA                                                                                                       |
|                                                         |                                                                         | DG sets           | 2×380KVA, 11×500KVA                                                                                                                 |
| 24.                                                     | Total water requirement during operation phase                          |                   | 1,238KLD                                                                                                                            |
| 25.                                                     | Net fresh water requirement after recycling treated sewage for flushing |                   | 714 KLD                                                                                                                             |
| <b><u>Environmental Setting</u></b>                     |                                                                         |                   |                                                                                                                                     |
| 26.                                                     | Baseline study area                                                     |                   | Area covering 10 km radius around the project site.                                                                                 |
| 27.                                                     | Baseline study period                                                   |                   | Month of April to June 2017                                                                                                         |
| 28.                                                     | Soil type in the study area                                             |                   | Sandy                                                                                                                               |
| 29.                                                     | Water quality                                                           |                   | Nine ground water samples including project site and one surface water sample. Analysis results are tabulated in the EIA report.    |
| 30.                                                     | Ambient air quality                                                     |                   | In Nine stations, ambient air quality analysis was carried out as per the CPCB guidelines. Results are tabulated in the EIA report. |
| 31.                                                     | Baseline noise levels                                                   |                   | Nine noise sampling locations were selected and analyses were carried out. Results are tabulated in the EIA report.                 |
| 32.                                                     | Nearest highway                                                         |                   | Sarjapur Main Road -1.6 km – (N)                                                                                                    |
| 33.                                                     | Nearest railway station                                                 |                   | Carmelaram Railway Station – 4 km (N)<br>Bengaluru city Railway Station - 17 km (NW)                                                |
| 34.                                                     | Nearest airport                                                         |                   | Kempegowda International Airport - 35 km (N)                                                                                        |

|                                                                 |                                                                      |                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 35.                                                             | Nearest lake                                                         | <i>Hadosiddapura lake – 150m (N)</i>                                                                                                                                                                                                                                                                                                                                        |
| 36.                                                             | Nearest Town/City                                                    | <i>City - Bengaluru</i>                                                                                                                                                                                                                                                                                                                                                     |
| 37.                                                             | Seismic Zone                                                         | <i>Seismic Zone – II</i>                                                                                                                                                                                                                                                                                                                                                    |
| 38.                                                             | Archaeologically important Places                                    | <i>None within 10 km radius</i>                                                                                                                                                                                                                                                                                                                                             |
| 39.                                                             | Protected areas as per Wildlife Protection Act, 1972                 | <i>None within 10 km radius</i>                                                                                                                                                                                                                                                                                                                                             |
| 40.                                                             | Reserved/ protected forests                                          | <i>None within 10 km radius</i>                                                                                                                                                                                                                                                                                                                                             |
| 41.                                                             | Defence Installations                                                | <i>None within 10 km radius</i>                                                                                                                                                                                                                                                                                                                                             |
| 42.                                                             | Interstate Boundary                                                  | <i>Karnataka – Tamilnadu State boundary – 10km (SW)</i>                                                                                                                                                                                                                                                                                                                     |
| 43.                                                             | Designated Land use of the Project site                              | <i>The project site is designated for Residential zone as per Revised Master Plan – 2015</i>                                                                                                                                                                                                                                                                                |
| <b><u>Environmental Management Plan: Construction Phase</u></b> |                                                                      |                                                                                                                                                                                                                                                                                                                                                                             |
| 44.                                                             | Soil Erosion                                                         | <ul style="list-style-type: none"> <li>• Temporary seeding will be done like planting of fast growing grasses to hold down the soils in disturbed areas so that they are less apt to be carried offsite by storm water runoff or wind.</li> </ul>                                                                                                                           |
| 45.                                                             | Noise Pollution from Construction equipments                         | <i>Acoustic measures for the noisy equipments and limited construction activities during day time.</i>                                                                                                                                                                                                                                                                      |
| 46.                                                             | Quantity of Domestic sewage during construction                      | <i>7.2 KLD</i>                                                                                                                                                                                                                                                                                                                                                              |
| 47.                                                             | Mode of treatment and disposal of domestic sewage (construction)     | <i>Generated sewage will be collected in collection tank and will be treated in septic tank</i>                                                                                                                                                                                                                                                                             |
| 48.                                                             | Air emissions from construction equipments                           | <i>Optimal usage of equipments and use of high quality fuel like HSD.</i>                                                                                                                                                                                                                                                                                                   |
| 49.                                                             | Air emissions and traffic volume due to raw materials transportation | <ul style="list-style-type: none"> <li>• Vehicles carrying construction materials will be well covered to avoid any spillage.</li> <li>• Raw material transportation vehicles will be maintained in good condition.</li> <li>• Traffic of 15 trucks/ day would be made to ply during less traffic hours.</li> <li>• Planning of optimal routes for the vehicles.</li> </ul> |
| 50.                                                             | Labour management                                                    | <i>Skilled laborers will be sourced locally.</i>                                                                                                                                                                                                                                                                                                                            |
| <b><u>Environmental Management Plan : Operational Phase</u></b> |                                                                      |                                                                                                                                                                                                                                                                                                                                                                             |
| 51.                                                             | Quantity of Sewage generated                                         | <i>1,115KLD</i>                                                                                                                                                                                                                                                                                                                                                             |
| 52.                                                             | Mode of treatment for Sewage                                         | <i>This sewage is treated in a sewage treatment plant to treat the sewage up to urban reuse standards using STP</i>                                                                                                                                                                                                                                                         |

|     |                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     |                                                                              | <i>of capacity 1300 KLD of Sequential Batch Reactor (SBR) Technology.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 53. | Quantity of treated sewage and mode of disposal                              | <i>Quantity of treated sewage: 1,059 KLD. Out of this, 524KLD will be used for flushing, 311KLD will be used for landscaping, 224 will be used for car &amp; floor washing</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 54. | Air & Noise pollution containment                                            | <ul style="list-style-type: none"> <li><i>• DG sets meeting the emission norms prescribed by KSPCB will be used.</i></li> <li><i>• Adequate stack height will be provided.</i></li> <li><i>• Acoustic enclosures will be installed in order to attenuate the noise level.</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 55. | Domestic solid wastes                                                        | <p><i>Total quantity: 4.2MT/day</i><br/> <i>Biodegradable wastes: 2.1MT/day</i><br/> <i>Non biodegradable wastes: 2.1MT/day</i></p> <p><i>The solid wastes generated shall be collected separately as organic and recyclable wastes in the respective bins provided.</i></p> <p><i>The segregated organic wastes will be processed in organic waste converter.</i></p> <p><i>The segregated recyclable wastes will be given to authorized vendors for further processing.</i></p> <p><i>STP Sludge shall be used as manure for gardening and landscaping.</i></p> <p><i>Hazardous wastes like waste oil from DG sets, used batteries, CDs, computer etc. will be handed over to the authorized hazardous waste recyclers.</i></p> <p><i>Generated E-Wastes will be collected separately &amp; handed over to the authorized &amp; approved by KSPCB E-waste processors.</i></p> |
| 56. | Sludge from STP                                                              | <i>56 kg/day, which will be used as manure for landscaping &amp; gardening.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 57. | Optimal utilization of natural resources and non-conventional energy sources | <p><i>Terrace runoff will be routed to roof rain water collection tank of capacity 2×160cum and will be used after pre-treatment. Surface runoff will be routed to 93 No's of recharge pits through internal garland drains to recharge the ground water and excess will be discharged to the existing storm water drain.</i></p> <p><i>Energy conservation devices such as Solar street lights, CFL bulbs, High Frequency ballast, Solar water heaters, Copper wound transformer are proposed in the project.</i></p>                                                                                                                                                                                                                                                                                                                                                          |
| 58. | Car Parking facility                                                         | <i>Required = 2,168 no's,</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |



|     |                       |                                                                   |
|-----|-----------------------|-------------------------------------------------------------------|
|     |                       | <i>Provided = 2,180 no's</i>                                      |
| 59. | Landscape development | <i>Native species are proposed for the landscape development.</i> |

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**CHAPTER - 1****INTRODUCTION****1.1 PREAMBLE**

Environmental Protection and Sustainable Development have been the cornerstones of the policies and procedures governing the industrial and other developmental activities in India. Ministry of Environment & Forests has taken several policy initiatives and enacted environmental and pollution control legislations to prevent indiscriminate exploitation of natural resources and has promoted integration of environmental concerns in developmental projects. One such initiative is the Environmental Impact Notification S.O. 1533 (E), dated 14<sup>th</sup> September 2006, as amended 2009, and amended in 2016 issued under Environment (Protection) Act, 1986, and has made it mandatory to obtain Environmental Clearance for specified categories of developmental projects.

EIA is an important tool for incorporating environmental concerns at the project level. It is a planning tool which is generally accepted as an integral component of sound decision-making. Its overall purpose is to establish a coherent policy and provide a basis for the co-ordinated work of various Government agencies with operational responsibility for the Environment & Natural resources. The objective of EIA is to foresee and address potential environmental problems/concerns at an early stage of project planning and design, early identification and characterization of critical environmental impacts allow the public and the Government to form a view about the environmental acceptability of a proposed developmental project and what conditions should apply to mitigate or reduce those risks and impacts.

**1.2 PURPOSE AND NEED OF THE PROJECT**

In the fast developing world these days the population is also increasing rapidly, so that the small towns and cities are changing into metropolitan cities there is scarcity of land in the cities and the business is growing and expanding very rapidly.

Bengaluru is a major city of India and a great place to live. As Bengaluru is teeming with cash-rich young professionals with a considerable amount of disposable

incomes; the retail sector has smelt a great opportunity and has increased the demand for residential property even more. Keeping in mind this rise in demand, property builders are making various types of accommodations including Apartments, Villas and Townships to cater to the needs of these clients.

With the unparalleled increment of the IT sector in Karnataka capital, the demand has increased for both type of commercial and residential real estate for leading into existence of Bengaluru real estate, in the destination of the city and its nearby areas. As the result, property builder in Bengaluru are growing towards boom for achieving success in the field of Bengaluru property market. They are making themselves reserve, building new, ever green and modern residential construction.

As far as residential properties in Bengaluru, present and future demand seems to have driven from IT professionals. However, this is also one of the leading reasons for the revival of demand for quality accommodation. A survey conducted by MT commissioned Indian Market Research Bureau (IMRB) among five cities stated that, amongst individuals aged between 25 to 39 years, stated that Bengaluru and Mumbai emerged as the most preferred places to live, which provides the best quality of life.

In response to the growing demands of residential properties with all features and amenities, M/s. APG Intelli Homes Private Limited is going for Expansion of Residential Apartment along with Row house by name *"Assetz Lifestyle - 63° East"*. Hence the total built up area by considering Existing & Expansion proposal will be **2,82,974.72Sqmt** to fulfil the needs.

As per the schedule of EIA Notification - 2006; the proposed project comes under item 8(b) and appraised as B1 (since BUA  $\geq 1, 50,000$  Sqmt ++).

Therefore, in order to assess the potential environmental impacts arising due to the proposed residential project, M/s. APG Intelli Homes Private Limited has appointed M/s. KRS Enterprises, Bengaluru to undertake Environmental Impact Assessment (EIA) study which covers a wide range of technical disciplines and incorporates baseline data for various environmental components, viz. air, noise, land, water quality & hydrology, ecology & biological parameters along with the parameters of human interest for the Environmental Impacts Assessment and to prepare

Environmental Management Plan (EMP) for mitigating the adverse impacts along with improvement and alternatives including delineation of post project Environmental Monitoring Programme.

An Environmental Impact Assessment (EIA) is prepared, based on studies carried out during the month of April 2017 to June 2017. The environmental attributes like ambient air, water, noise, land including biological and socio-economic components of environment for an area covering 10km radius with project site as centre.

### **1.3 BACKGROUND OF THE PROMOTERS**

Headquartered in Singapore, Assetz Property Group (Assetz) was established in India in 2006 as the country's first end-to-end professional real estate services business. Through its various ventures, Assetz has developed multiple institutional investment grade assets across residential, commercial and mixed-use segments in India.

*Assetz Lifestyle - 63° East* is a proposed residential development project of M/s. APG Intelli Homes Private Limited consisting of residential apartments & Row houses, coming up on a land measuring about 1,06,786.42 Sqmt (26.38 Acres) at Survey No's. 69/1, 69/2, 69/3, 69/4 & 171 of Kodathi Village, Varthur Hobli, Bengaluru East Taluk, Bengaluru District, Karnataka.

Initially for the development of residential project Environmental Clearance has been obtained for built up area of 1,29,147.98 Sqmt at the site area of 71,932 (17.77 Acres). Due to the market demand, we have planned to expand the project by constructing row house as well as additional apartment towers of additional built up area of about 1,53,826.74 Sqmt is proposed. Hence we are seeking EC under Expansion including the existing & present proposal with total Built up Area of 2,82,974.72Sqmt. The proposed residential project is committed to provide modern day housing facilities, from a breathtaking exterior to comfortable interior with necessary safeguards. The landscape concept of the project area has evolved a system of open spaces, which have the potential to develop into a landscape with distinctive visual qualities, fulfilling the required ecological functions.

Assetz Property Group Company committed to the development of investment grade projects across world through its various strategic ventures, the Group is involved in:

- Developing its own projects across residential, commercial & mixed-use asset classes and
- Acting as a full-service development management service provider for complex, investment grade projects.

Today Assetz Property Group involved in a series of most promising projects in the world across a variety of sectors. Their approach to service delivery is characterized by the scientific and skill-driven approach for real estate development. With several years of cross-geographical experience in professional real estate services with leading multinational corporations, they are constantly delivering developments of the highest global standards.

The major hallmark is that of innovation, which bring the knowledge of the most cutting-edge international trends & best practices which enables us to deliver a series of firsts in the Indian marketplace. For instance, the first LEED Platinum Certified Business Park amongst the early Special Economic Zones (SEZs) in India.

Over the past half a decade, Assetz Property Group has built and operated a wide range of state-of-the-art projects. Assetz projects are renowned for their innovation, award winning design & build approach and adherence to the most contemporary global standards.

#### **1.4 OBJECTIVES OF THE EIA STUDY**

The purpose of Environmental Impact Assessment (EIA) is to assist in the decision making process and to ensure that the projects under consideration are environmentally sound and sustainable. EIA identifies the ways of improving project environmentally by preventing, minimizing, mitigating or compensating for adverse impacts.

Urban development projects including housing and office complexes do have the potential in altering environmental resources of any urban area. They cause stress

on local environmental assets of the urban area and could become the potential source for limiting the growth of the city. Unplanned construction and operation of such projects usually result in impacts on various facets of Environment keeping above issues under considerations, an Environmental Impact Assessment (EIA) study is conducted which incorporates into development and planning process, a plan for environmental protection and conservation. The procedure identifies the possible positive and negative impacts on the environment likely to emanate as a result of construction and operation of a project. The EIA thus, provides for a plan which, upon implementation, will reduce or offset the negative impacts of a project resulting in a minimum level of environmental degradation. This minimization may be a result of implementation of a project modifications or environmental protection measures which simply reduces the severity or number or magnitude of negative impacts. The plan may also result in utilization of positive impacts for enhancement measures which offset negative impacts.

To measure the level of plan implementation and the degree of effectiveness of the above environmental protection provisions, the EIA provides a monitoring programme. This programme is so designed that it identifies the parameters of uncertainty and measures the related impacts.

It is necessary that there is close integration of EIA with various aspects of a project including financial and engineering aspects which ensures environmental consideration are given due weight in project selection, sitting design and operation.

Analysis of past experiences indicate that it is necessary to examine a number of problem areas in order to ensure that environmental concerns can be effectively integrated in the development process. Similar approach has been adopted while conducting the EIA study for the proposed residential apartment.

## **1.5 STAGES IN THE EIA STUDY**

The purpose of this section is to itemize the methodology for Environmental Impact Assessment (EIA) which has been followed for this study. Any activity relating to construction and operation is expected to cause impacts on surrounding

environment. The impacts may be adverse or beneficial, short term or long term, and reversible or irreversible. In order to assess the significance of impacts, various steps that are used in conducting an EIA within core and buffer zone around the proposed project construction site are divided into the following phases:

- Identification of significant environmental parameters and assessing the existing status within the impact zone with respect to air, water, noise, land, biological, and socioeconomic components of environment.
- Study of various activities of the proposed project components to identify the areas leading to impact/change in environmental quality.
- Identification of potential impacts on various environmental components due to the activities envisaged during pre-construction, construction, and operational phases of the proposed project.
- Prediction of significant impacts on the major environmental components using qualitative / quantitative techniques.
- Preparation of environmental impact statement based on the identification, prediction and evaluation of impacts.
- Delineation of environmental management plan (EMP) outlining preventive and curative strategies for minimizing adverse impacts during pre-construction, construction and operational phases of the proposed project.
- Formulation of environment quality monitoring programme for construction and operational phases to be pursued by the project proponent.

The environmental impact assessment in India was started in the year 1976-77 when the Planning Commission asked the Department of Science and Technology to examine the river-valley projects from environmental angle. This was subsequently extended to cover those projects, which required approval of the Public Investment Board. These were administrative decisions, and lacked the legislative support. The Government of India enacted the Environment (Protection) Act on 23<sup>rd</sup> May 1986. To achieve the objectives of the Act, one of the decisions that were taken is to make environmental impact assessment statutory. After following the legal procedure, a

notification was issued on 27th January 1994 and subsequently amended on 4th May 1994, 10th April 1997, 27th January 2000, 7th July 2004 and 14th September 2006 making environmental impact assessment statutory for 32 projects /activities. This is the principal piece of legislation governing environmental impact assessment. As per the EIA Notification, 14th September 2006 published in the Gazette of India, Extraordinary, Part-II and Section-3, Sub-section (ii) Ministry of Environment and Forests, proposed project is listed as Category B1 as per Item No. 8(b) mentioned in the schedule (Covering an area = 50 ha and or built up area = 1,50,000 Sq. mtrs). So, the category B1 Projects requires preparation of EIA Report.

In order to get an idea about the existing state of the environment, various environmental attributes such as meteorology, air quality, water quality noise level, soil quality, ecology and socio-economic environment were studied / monitored. Details of Flora and fauna were identified in the study area comprising of core and buffer zone for identification of existing species and classifying them as per Wildlife (Protection) Act, 1972.

## **1.6 SCOPE OF ENVIRONMENTAL IMPACT ASSESSMENT**

EIA study includes determination of baseline conditions, assessment of the impacts on the environment due to operation of the project and making recommendations on the preventive measures to be taken, to minimize the impact on the environment to acceptable levels. A suitable post-study monitoring program will be outlined. Scope has been so evolved that the data meets all MoEF requirements for conducting Environmental Impact Assessment (EIA). Various components covered in the baseline environmental studies & methodologies adopted are given below.

EIA study shall cover the following aspects,

- Evaluation of present environmental factors through analysis of generated and collected baseline data for one complete non-monsoon season (3 months).
- Assess the probable impact on the environmental factors due to implementation of the project with respect to existing scenario.



- A thorough study of the process including provisions of pollution control, and Environmental Management Plan that includes prediction of impacts and relevant mathematical modelling.
- Assess the probable risk at the proposed plant.
- Preparation of Environmental monitoring program.
- Develop an Environmental Management Plan and on site Disaster Management Plan for the proposed project to mitigate the negative significant impacts that would arise from the proposed project and controlling the pollution levels
- Environmental Monitoring Plan is suggested for monitoring the pollution loads at various facilities in the premises and to ensure compliance with the statutory requirements.
- The baseline data has been collected for the following environmental components, during April to June, 2017
  - ♣ Air quality
  - ♣ Meteorology
  - ♣ Noise environment
  - ♣ Water use & quality
  - ♣ Soil quality
  - ♣ Land use, crop pattern, Agricultural practices
  - ♣ Demographic aspects
  - ♣ Ecology & Biodiversity

An Environmental Impact Assessment and Environment Management Plan comprising an overall assessment of the impact due to project activity over baseline condition of the existing environment and a mitigating action plan to counter the adverse impact as defined. An environmental monitoring program is also prepared to provide scientific support to future actions of environmental protection.

**1.7 STRUCTURE OF EIA REPORT**

The EIA report has been structured covering various aspects like project description, baseline conditions, environmental impacts, mitigation measures, environmental management plan as directed by SEIAA vide letter of awarded ToR. Copy of ToR and its compliance is provided at the beginning of this report. Further, the present EIA report has been prepared chapter-wise in accordance with generic structure suggested by MoEF in EIA notification.

**TABLE-1.1: PROPOSED TOR FOR ENVIRONMENTAL IMPACT ASSESSMENT**

| <b>Sr. No.</b> | <b>EIA structure</b>                        | <b>Contents</b>                                                                                                                                                                                                                                                                                                                                                                            |
|----------------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chapter - 1    | Introduction                                | <ul style="list-style-type: none"><li>➤ Identification of project and project proponent</li><li>➤ Need, objectives &amp; purposes of EIA study</li><li>➤ EIA structure &amp; Regulatory frame work</li></ul>                                                                                                                                                                               |
| Chapter - 2    | Project Description                         | <ul style="list-style-type: none"><li>➤ Description &amp; Justification of the project</li><li>➤ Project location &amp; salient features of the project site</li><li>➤ Maps showing project location, plant layout &amp; Description of facilities, infrastructure need, resource requirement, pollution potentials &amp; management</li></ul>                                             |
| Chapter - 3    | Description of the Environment              | <ul style="list-style-type: none"><li>➤ Approach &amp; methodology of baseline study</li><li>➤ Establishment of baseline status for valued environmental parameters as identified in scope</li><li>➤ Maps of study area showing sampling &amp; monitoring locations and land use pattern</li></ul>                                                                                         |
| Chapter - 4    | Anticipated Impacts and Mitigation Measures | <ul style="list-style-type: none"><li>➤ Identification &amp; prediction of environmental impacts during construction as well as operation phases of the proposed project</li><li>➤ Evaluation of impacts on air environment using mathematical model</li><li>➤ Mitigation measures for minimizing and/or avoiding adverse impacts during construction as well as operation phase</li></ul> |

|              |                                        |                                                                                                                                                                                                                                                                           |
|--------------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chapter - 5  | Analysis of site alternatives          | <ul style="list-style-type: none"> <li>➤ Alternative technologies</li> <li>➤ Justification of site selection</li> </ul>                                                                                                                                                   |
| Chapter - 6  | Environmental Monitoring Program       | Technical aspects of monitoring the effectiveness of mitigation measures including measurement methodologies, frequency, location, data analysis, reporting schedules                                                                                                     |
| Chapter - 7  | Additional Studies                     | --                                                                                                                                                                                                                                                                        |
| Chapter - 8  | Project Benefits                       | <ul style="list-style-type: none"> <li>➤ Employment opportunity and corporate social responsibility CSR</li> <li>➤ Socio-economic development and improvements in the physical &amp; social infrastructure</li> <li>➤ Employment &amp; other tangible benefits</li> </ul> |
| Chapter - 9  | Environmental Management Plan          | <ul style="list-style-type: none"> <li>➤ Environmental Management Plan for various project activities</li> <li>➤ Illustration of greenbelt development plan, rain water harvesting system</li> <li>➤ Budgetary allocation for environment protection</li> </ul>           |
| Chapter - 10 | Summary and Conclusion                 | <ul style="list-style-type: none"> <li>➤ Salient features of the project covering, project description, location, mitigation measures, costing, etc.,</li> <li>➤ Overall conclusion for the proposed project</li> </ul>                                                   |
| Chapter - 11 | Disclosure of Consultant Engaged       | Details of the EIA consultant, laboratory engaged                                                                                                                                                                                                                         |
| Chapter - 12 | Corporate Environmental responsibility | Details of initiative planned under Corporate Environmental responsibility.                                                                                                                                                                                               |

## **1.8 APPLICABLE ENVIRONMENTAL REGULATIONS AND STANDARDS**

With respect to prevention and control of environmental pollution, the proposed project is governed by the following Acts and Rules.

- ☞ Water (Prevention and Control of Pollution) Act, 1974 as amended in 1978 and 1988;

- ☞ Air (Prevention and Control of Pollution) Act, 1981 as amended in 1987;
  - ☞ Environment (Protection) Act, 1986 amended 1991 and Environment (Protection) Rules, 1986 and amendments thereafter;
  - ☞ Hazardous Waste (Management & Handling) Rules, 1989, as amended in 2000, 2003.
  - ☞ The Noise Pollution (Regulation and Control) Rules, 2000 and as amended in 2002, 2006 and 2010.
  - ☞ EIA notification dated 07.07.2004 as amended in 14.09.2006 and 01.12.2009 and amended as on 9<sup>th</sup> December 2016.
- Stating that for any project or activity specified in category ‘B’ in the item 8 of schedule i.e. building/construction projects/area development projects and townships crossing the built up area of more than 1,50,000 Sqmt and less than 3,00,000 Sqmt, TOR should be conveyed to SEIAA, based on the approved TOR, EIA studies should be conducted which also includes an Environmental Management Plan for the mitigation of these impacts.

**TABLE-1.2: COMPLIANCE STATUS OF THE EXISTING PROJECT**

| Sl. No. | Compliance                                                                                           | Status                                                                                                                                                                                                                                                                                                          |
|---------|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | Status of Environmental Clearance and compliance for the terms & conditions for the existing project | <i>Environmental Clearance (EC) was obtained earlier from SEIAA, Karnataka. EC Vide No. SEIAA: 87 CON 2015 dated 16.2.2016 is enclosed as <b>Annexure-1</b> Compliance for the earlier Environmental Clearance was submitted to SEIAA and Regional office, MoEF, Bangalore is enclosed as <b>Annexure-2</b></i> |
| 2       | Validity of the Air & Water consent orders from KSPCB for the existing project                       | <i>Consent for Establishment (CFE) has been obtained from Karnataka State pollution Control board (KSPCB) order No. PCB/138/CNP/15/H605 dated 26<sup>th</sup> August 2015 is enclosed as <b>Annexure-3</b></i>                                                                                                  |

## **PROJECT DESCRIPTION**

This chapter encompasses the details of the proposed project, material and resource requirement during construction and operation phases, utilities, sources of waste generation, estimation of pollution loads and associated infrastructures etc.

### **2.1 TYPE OF THE PROJECT**

M/s. APG Intelli Homes Private Limited is going for an Expansion of Residential Apartment by name "Assetz Lifestyle - 63° East" also Row houses, coming up on a land measuring about 1,06,786.42 Sqmt (26.38 Acres) at Survey No's. 69/1, 69/2, 69/3, 69/4 & 171 of Kodathi Village, Varthur Hobli, Bengaluru East Taluk, Bengaluru District, Karnataka. The proposed project provides a luxurious residential apartment with modern amenities and comfortable living for the occupants.

### **2.2. NEED FOR THE PROJECT**

Bengaluru is a major city of India and a great place to live. As Bengaluru is teeming with cash-rich young professionals with a considerable amount of disposable incomes; the retail sector has smelt a great opportunity and has increased the demand for residential property even more. Keeping in mind this rise in demand, property builders are making various types of accommodations including apartments, villas and townships to cater to the needs of these clients.

As far as residential properties in Bengaluru, present and future demand seems to have driven from IT professionals. The population of Bengaluru has grown enormously on account of migration of people from all corners of India. The one that needs to be tackled immediately is housing. In response to the growing demands of residential properties with all features and amenities, project has been revised for expansion of residential apartment.

- The project will provide dwelling spaces of about 1,929 units, which will meet the demand of the region for growing population in Bengaluru.
- Socio-economic status of the site and site surrounding region will improve.

- Around 200 employees during construction phase and around 50 employees during operational phase of the project will get employment opportunity

### **2.3. CRITERIA FOR SITE SELECTION**

The project is already in the construction stage. However, the following criteria were followed during site selection of the proposed project;

- The land proposed for the development is free from litigations.
- The proposed area is confirming to land use of CDP.
- Fast developing area.
- Sub-soil strata suitable for laying foundation for buildings having multi-floors.

### **2.4. PROJECT SITE**

The proposed residential development project is located at Kodathi Village, Varthur Hobli, Bengaluru East Taluk, Bengaluru district of Karnataka. The environmental setting of the project site, location map and photography of the project site are as follows;

**TABLE-2.1: ENVIRONMENTAL SETTING OF THE SITE**

| <b>SL No</b> | <b>Particulars</b>            | <b>Details</b>                                                                                         |
|--------------|-------------------------------|--------------------------------------------------------------------------------------------------------|
| 1.           | Present land use              | <i>As per the Revised Master Plan of BDA-2015, the project site is designated as Residential Zone.</i> |
| 2.           | Survey of India top sheet No. | <i>57 H/9, 57 H/13</i>                                                                                 |
| 3.           | Site topography               | <i>Project site is a vacant land and is sloping towards North direction.</i>                           |
| 4.           | Nearest Highway               | <i>Sarjapur Main Road -1.6 km – (N)</i>                                                                |
| 5.           | Nearest Railway station       | <i>Carmelaram Railway Station – 4 km (N)<br/>Bengaluru city Railway Station - 17 km (NW)</i>           |
| 6.           | Nearest Airport               | <i>Kempegowda International Airport, which is around 35 km (N) from the site.</i>                      |
| 7.           | Nearest Lakes                 | <i>Hadosiddapura lake – 150m (N)</i>                                                                   |
| 8.           | Nearest fire station          | <i>Sarjapur fire station – 2.5km (NW)</i>                                                              |
| 9.           | Nearest Town/City             | <i>City – Bengaluru</i>                                                                                |
| 10.          | Nearest Villages              | <i>Kodathi village</i>                                                                                 |
| 11.          | Seismic Zone                  | <i>Seismic Zone – II</i>                                                                               |
| 12.          | Interstate Boundary           | <i>Karnataka – Tamilnadu State boundary –10km (SW)</i>                                                 |

*Note: All distances mentioned are aerial distance*



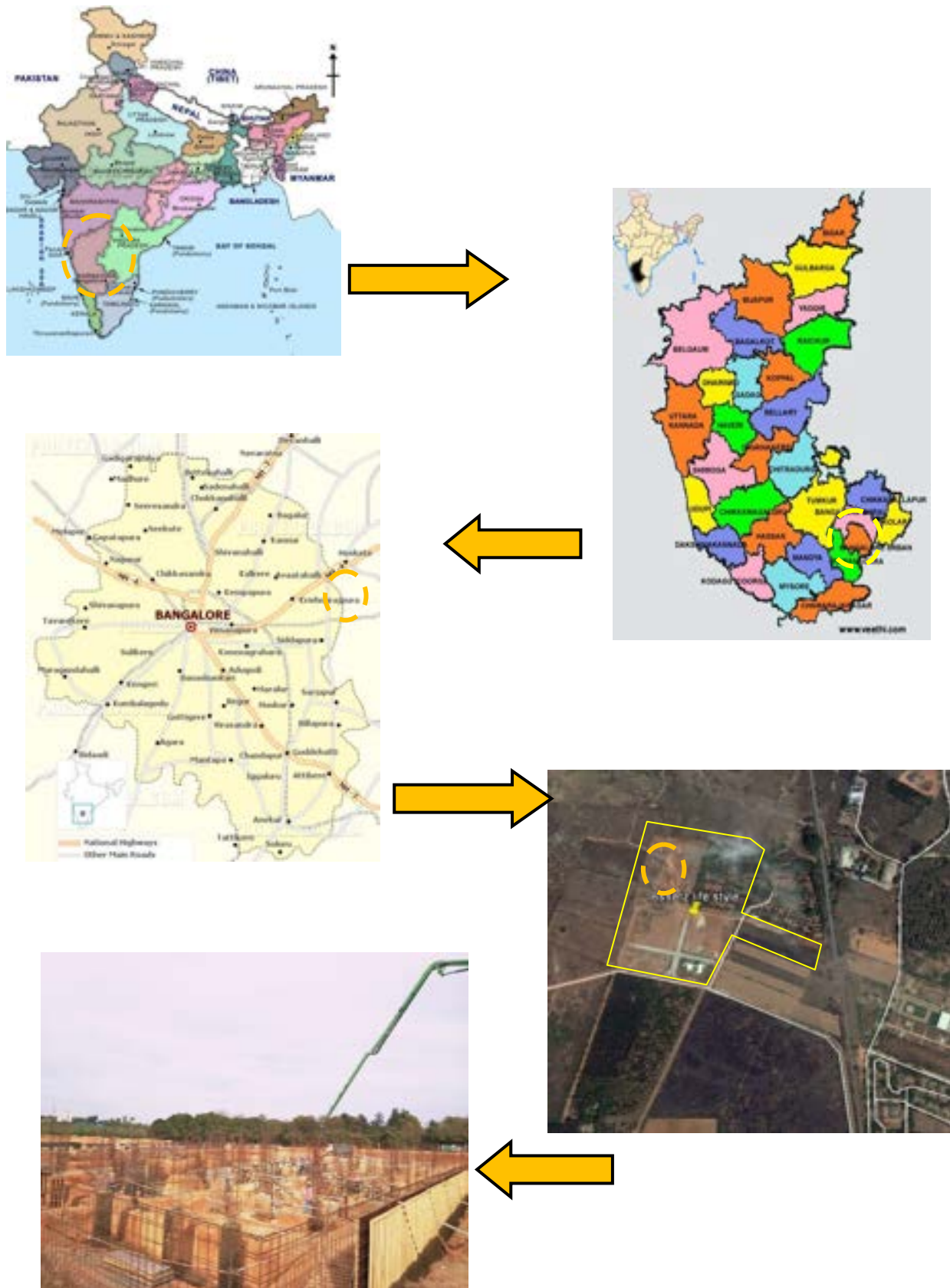


FIGURE-2.1: VICINITY OF THE PROJECT SITE

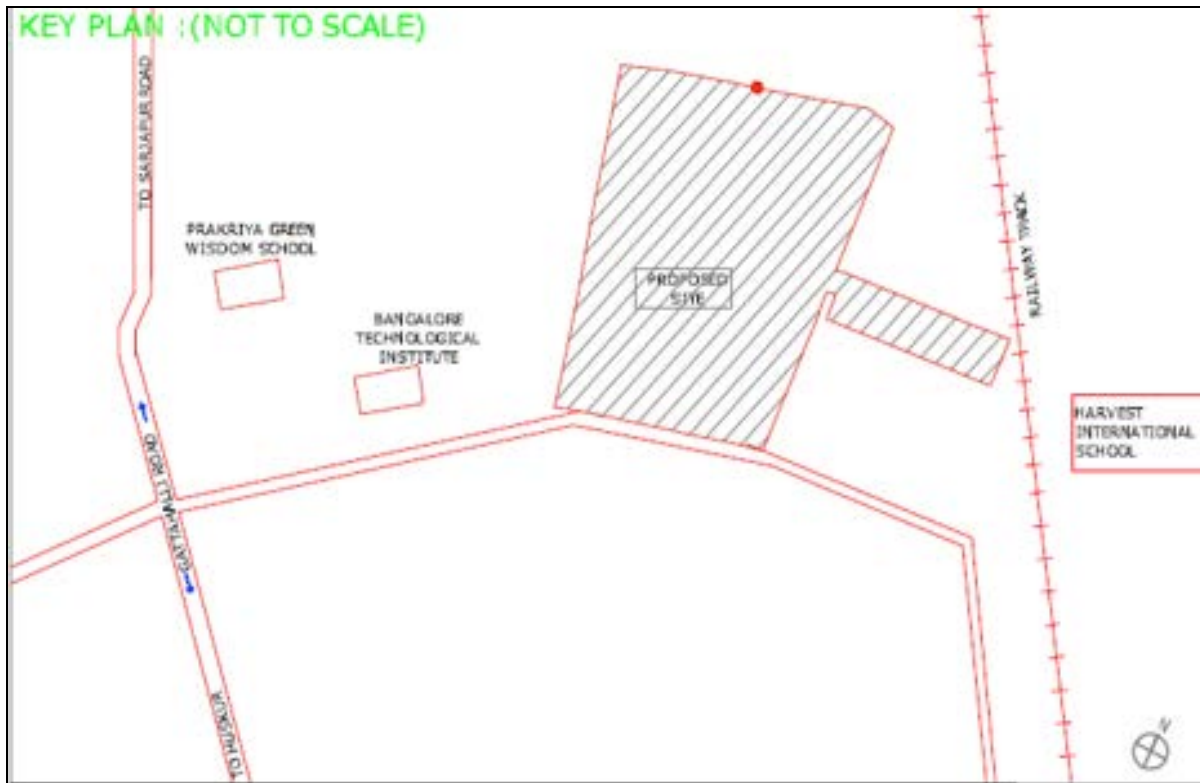
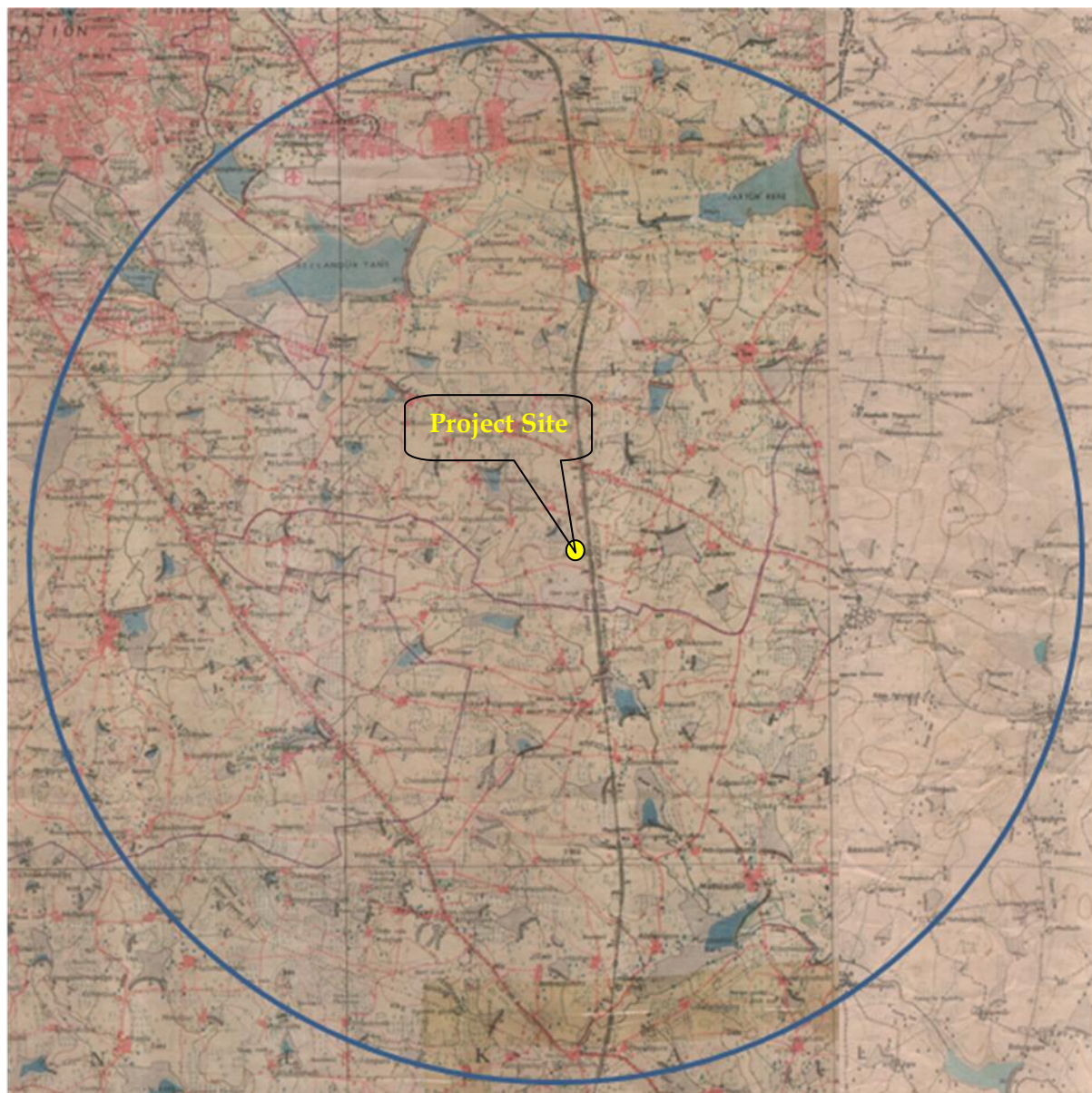


FIGURE-2.2: LOCATION OF THE PROPOSED PROJECT SITE



FIGURE-2.3: AERIAL VIEW OF THE PROJECT SITE





*Source: Survey of India*

**Scale:**  
**1cm: 0.5km**  
**20cm: 10km**

**SURVEY OF  
INDIA:  
TOPO SHEET**

**FIGURE-2.4: TOPO MAP OF THE PROJECT SITE**

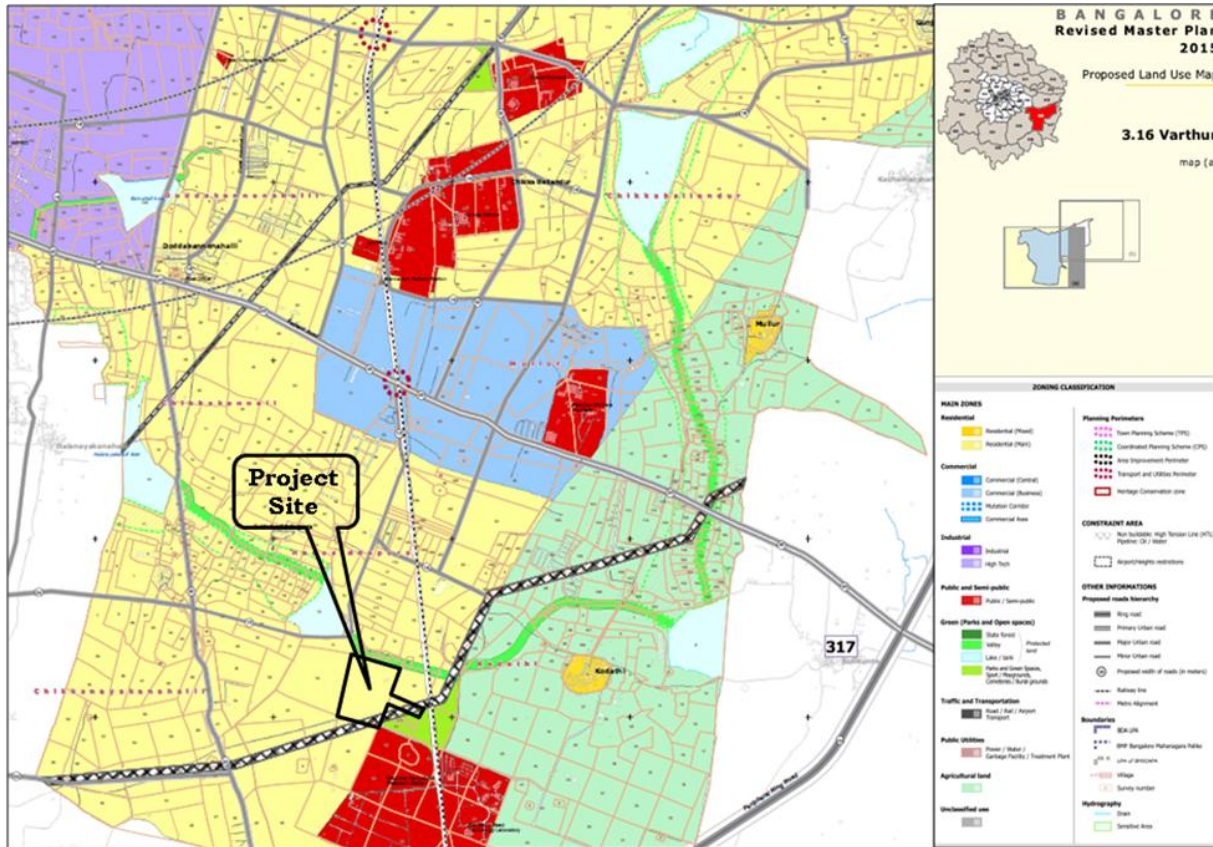


FIGURE-2.5: CDP MAP OF THE PROJECT SITE

## 2.5. PROPOSED SCHEDULE AND APPROVAL FOR IMPLEMENTATION

Successful execution of the project largely depends on the coordinated approach of the project implementing agencies. Proper coordination between the various project execution agencies, monitoring of project schedules, appropriate mobilization of manpower and other resources can achieve affective cost control and timely completion of the project. The broad time frame required for implementation and completion of the project would be approximately 60 months, after obtaining the all necessary clearances.

## 2.6. DESCRIPTION OF THE PROJECT

The site is abutting 12.5 m road. The present land use of the site as per CDP is residential zone. The land use is converted from agricultural usage to residential land use by the project proponent. About 657 no's of tree species found at site as per contour plan; 291 number of trees is retained as landscape. There is a tertiary nala passing in the north side of the project site by leaving buffer about 25m from the site boundary. Out of total 1,06,786.42 Sqmt (26.38 Acres) of site area, there is no Kharab land in the proposed



site but area of about 0-06 Guntas high tension wire line is passing with the site, which is no construction zone. Land documents are enclosed as Annexure-4. Some of the internal roads are constructed as part of development of the project.

| Survey Nos.  | Area                | As per conversion & RTC document                            |
|--------------|---------------------|-------------------------------------------------------------|
| 69/1         | 8 Acres 28 Guntas   | No Karab land                                               |
| 69/2         | 3 Acres 00 Guntas   | No Karab land                                               |
| 69/3         | 6 Acres 03 Guntas   | No Karab land                                               |
| 69/4         | 6 Acres 04 Guntas   | No Karab land                                               |
| 171/1 as 171 | 1 Acres 11 Guntas   | 6 Guntas for high tension wire line<br>3.08 Guntas for Road |
| 171/2 as 171 | 1 Acres 9.08 Guntas | 1 Acres 4.08 Guntas for residential<br>5 Guntas for park    |

The proposed project is a development of Residential Apartment is coming up in total land area of 26.38 Acres. As the present project is an expansion proposal, expansion of two towers by residential apartment and also proposing row housing with club house. Environmental Clearance has been obtained for built up area of 1,29,147.98 Sqmt consists of 960 number of residential units in three towers.

Requires EC under expansion for total built-up area is 2,82,974.72 Sqmt consisting of six towers of residential apartment, row house with max height of 59.9m. The site plan showing proposed components is presented in **Annexure-5**.

At present, construction has been started and it is in footing stage as per the approved environmental clearance. Excavation will be done for basement preparation for expansion and it will be restricted to minimize the excavation. The topography of the land at project site sloping towards North direction with an average contour level difference of 11m, depending on the detailed contour survey and safe grade elevation/storm water drainage studies with respect to the general grade level of the area. Contour plan showing existing contour levels, trees, drainage line etc which is attached as **Annexure-6**.

Layout of the project components have been optimized within the site premises, considering the space requirement for all the services, buildings, structures, raw water

storage tank, fire water storage tank, wastewater treatment plants, solid waste management yard etc. Details of the projects are mentioned below:

**TABLE-2.2: PROJECT PLANNING DETAILS**

| Project Planning               |                                                                         | Details                                                                                             |
|--------------------------------|-------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| Total Site area                |                                                                         | 1,06,786.42 Sqmt (26.38 Acres)                                                                      |
| Total Built up Area            | EC obtained for                                                         | 3 Towers of B, C & D = 1,29,147.98 Sqmt                                                             |
|                                | Proposed buildings                                                      | 3 Towers of E, F & A, and Row house = 1,53,826.74 Sqmt                                              |
|                                | EC required for by considering earlier & Present proposed built-up area | <b>Built up area of 2,82,974.72 Sqmt (1,29,147.98+1,53,826.74) with total number of 1,929 units</b> |
| Height of Building             |                                                                         | 59.9 m (maximum)                                                                                    |
| Ground coverage Area           |                                                                         | 33,229.18 Sqmt (33.2%)                                                                              |
| Latitude                       |                                                                         | 12° 53' 11.3" N                                                                                     |
| Longitude                      |                                                                         | 77° 42' 17.2" E                                                                                     |
| Width of the approach Road (m) |                                                                         | 12.5m (ROW)                                                                                         |
| Car Parking required           |                                                                         | 2,168 Nos.                                                                                          |
| Car Parking provided           |                                                                         | 2,180 Nos.                                                                                          |

**TABLE-2.3: AREA STATEMENT**

|                                |                                           |
|--------------------------------|-------------------------------------------|
| Total site area                | 1,06,786.42 Sqmt (26.38 Acres)            |
| Civic amenity area             | 6,697.28 Sqmt (6.27% of site area)        |
| Net site area for development  | 1,00,089.14 Sqmt                          |
| Permissible F.A.R              | 2.25                                      |
| Achieved F.A.R                 | 2.18                                      |
| Permissible ground coverage    | 55%                                       |
| Proposed ground coverage       | 33,229.18 Sqmt / 1,00,089.14 Sqmt = 33.2% |
| Maximum height of the building | 59.9 m (Max.)                             |

**TABLE-2.4: BUILDING -WISE DISTRIBUTION OF TOWERS**

| Description | Built-up area | Building configuration | Height |
|-------------|---------------|------------------------|--------|
| Tower -A    | 47,406.57     | G+14 floors            | 44.9   |
| Tower -B    | 46,247.91     | G+14 floors            | 44.9   |
| Tower -C    | 40,161.44     | B+G+14 floors          | 44.9   |
| Tower -D    | 40,334.11     | B+G+13 floors          | 44.9   |
| Tower -E    | 67,426.84     | B+G+19 floors          | 59.9   |



|                            |              |                    |               |       |
|----------------------------|--------------|--------------------|---------------|-------|
| Tower -F                   |              | 18,178.44          | B+G+14 floors | 44.85 |
| Row house                  | Building - 1 | 3,078.12           | G+3 floors    | 11.7  |
|                            | Building -2  | 595.65             |               | 11.7  |
|                            | Building -3  | 3,278.80           |               | 11.7  |
|                            | Building -4  | 1,665.64           |               | 11.7  |
|                            | Building -5  | 2,079.15           |               | 12.0  |
|                            | Building -6  | 2,707.17           |               | 12.0  |
|                            | Building -7  | 1,850.45           |               | 11.7  |
|                            | Building -8  | 2,952.96           |               | 11.7  |
|                            | Building -9  | 3,159.19           |               | 12.0  |
|                            | Building -10 | 1,852.28           |               | 12.0  |
| Total                      |              | 23,219.41          |               |       |
| <b>Total built up area</b> |              | <b>2,82,974.72</b> |               |       |

**TABLE-2.5: DWELLINGS SUMMARY**

| Description          | No. of units per floor | No. of floors | Total No. of Units | EWS        |
|----------------------|------------------------|---------------|--------------------|------------|
| Tower -A             | 24                     | 13            | 310                | 2          |
| Tower -B             | 25                     | 13            | 286                | 39         |
| Tower -C             | 24                     | 14            | 252                | 84         |
| Tower -D             | 24                     | 13            | 312                | --         |
| Tower -E             | 25                     | 19            | 418                | 57         |
| Tower -F             | 6                      | 15            | 90                 | --         |
| Row house            | --                     | 4             | 79                 | --         |
| <b>Total - 1,929</b> |                        |               | <b>1,747</b>       | <b>182</b> |

**TABLE-2.6: DETAILS OF LAND USE WITHIN THE SITE**

| Description of usage                              | Area in Sqmt | %usage |
|---------------------------------------------------|--------------|--------|
| Total site area                                   | 1,06,786.42  | --     |
| Civic amenities                                   | 6,697.28     | 6.27%  |
| Net site area for development                     | 1,00,089.14  | 100    |
|                                                   |              |        |
| Ground coverage area                              | 33,229.18    | 33.2   |
| Driveway/ hardscape area                          | 22,738.95    | 22.72  |
| Landscape area<br>(including park and open space) | 39,006.55    | 38.98  |
| Service area                                      | 1,014.46     | 1.01   |
| Surface parking area                              | 4,100.00     | 4.09   |

**TABLE-2.7: COMPARATIVE STATEMENT OF THE SALIENT FEATURES OF THE EARLIER ENVIRONMENTAL CLEARANCE (EC) OBTAINED AND PRESENT PROPOSAL**

| S. No. | Features            | Unit     | EC Obtained                                                                                                 | Present Proposal                                                                                                      |             |                        |        |       |     |
|--------|---------------------|----------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------|------------------------|--------|-------|-----|
| 1.     | Subject number      | File No. | SEIAA:87:CON:2015                                                                                           | SEIAA:60:CON:2017                                                                                                     |             |                        |        |       |     |
| 2.     | Project Name        | --       | Assetz Life Style 63° East                                                                                  | Assetz Lifestyle 63° East                                                                                             |             |                        |        |       |     |
| 3.     | Developer           | --       | M/s. APG Intelli Homes Private limited                                                                      | M/s. APG Intelli Homes Private limited                                                                                |             |                        |        |       |     |
| 4.     | Type of Development | --       | Residential Apartment                                                                                       | Residential Apartment and Row house                                                                                   |             |                        |        |       |     |
| 5.     | Project address     | --       | Survey No's. 69/1, 69/2, & 69/3 of Kodathi Village, Varthur Hobli, Bengaluru East Taluk, Bengaluru District | Survey No's. 69/1, 69/2, 69/3, 69/4 & 171 of Kodathi Village, Varthur Hobli, Bengaluru East Taluk, Bengaluru District |             |                        |        |       |     |
| 6.     | Plot Area           | Sqmt     | 71,932 (17.77 Acres)                                                                                        | 1,06,786.42 Sqmt (26.38 Acres)                                                                                        |             |                        |        |       |     |
| 7.     | Gross Built Up Area | Sqmt     | 1,29,147.98                                                                                                 | 2,82,974.72 Sqmt                                                                                                      |             |                        |        |       |     |
| 8.     | Landscape area      | Sqmt     | 41,893.6                                                                                                    | 39,006.55 Sqmt (38.98%)                                                                                               |             |                        |        |       |     |
| 9.     | Number of units     | Nos.     | 960                                                                                                         | 1,929 including EWS units                                                                                             |             |                        |        |       |     |
| 10.    | Building Floors     |          | Tower-B: G+14 floors<br>Tower-C: B+G+14 floors<br>Tower-D: G+14 floors                                      | S. No                                                                                                                 | Description | Building configuration | Height | Units | EWS |
|        |                     |          |                                                                                                             | 1                                                                                                                     | Tower -A    | G+14 floors            | 44.9   | 310   | 2   |
|        |                     |          |                                                                                                             | 2                                                                                                                     | Tower -B    | G+14 floors            | 44.9   | 286   | 39  |
|        |                     |          |                                                                                                             | 3                                                                                                                     | Tower -C    | B+G+14 floors          | 44.9   | 252   | 84  |
|        |                     |          |                                                                                                             | 4                                                                                                                     | Tower -D    | B+G+13 floors          | 44.9   | 312   | --  |
|        |                     |          |                                                                                                             | 5                                                                                                                     | Tower -E    | B+G+19 floors          | 59.9   | 418   | 57  |

|     |                                          |        |                                     |                                       |           |               |       |              |            |
|-----|------------------------------------------|--------|-------------------------------------|---------------------------------------|-----------|---------------|-------|--------------|------------|
|     |                                          |        |                                     | 6                                     | Tower -F  | B+G+14 floors | 44.85 | 90           | --         |
|     |                                          |        |                                     | 7                                     | Row house | G+3 floors    | 12.0  | 79           | --         |
|     |                                          |        |                                     | <b>Total - 1,929</b>                  |           |               |       | <b>1,747</b> | <b>182</b> |
| 11. | Water requirement                        | KLD    | 447 (Fresh water + Recycling water) | 1,238 (Fresh water + Recycling water) |           |               |       |              |            |
| 12. | Source of water                          | --     | Borewell/Tankers                    | Bore well                             |           |               |       |              |            |
| 13. | Wastewater generation                    | KLD    | 402                                 | 1,115                                 |           |               |       |              |            |
| 14. | STP capacity                             | KLD    | 405                                 | 1,300                                 |           |               |       |              |            |
| 15. | Solid Waste                              | Kg/day | 1,790                               | 4.2 MT/day                            |           |               |       |              |            |
| 16. | Power requirement                        | KVA    | 3,781                               | 11,267 kW                             |           |               |       |              |            |
| 17. | Power Source                             | --     | BESCOM                              | BESCOM                                |           |               |       |              |            |
| 18. | Backup power (DG sets)                   | KVA    | 5×500 KVA                           | 2×380 KVA, 11×500 KVA                 |           |               |       |              |            |
| 19. | Car Parking facilities                   | PCU    | 967                                 | 2,180                                 |           |               |       |              |            |
| 20. | Roof rain water collection tank capacity | Cum    | 150                                 | 2×160cum                              |           |               |       |              |            |
| 21. | Recharge pits                            | Nos.   | 70                                  | 93                                    |           |               |       |              |            |
| 22. | Project cost                             | Rs.    | 300 Crores                          | 457 Crores                            |           |               |       |              |            |

**COST OF THE PROJECT:**

The total investment cost involved in setting up of the project is estimated to be about Rs. 457 Crores. Details with expenditure on land, land development, building plant, electrification, utilities, other fixed assets, preliminary and pro-operation, contingencies, etc.,

**TABLE-2.8: COST BREAKUP OF THE PROJECT**

| Sl. No.      | Details           | Description of Item       | Cost in Rs.           |
|--------------|-------------------|---------------------------|-----------------------|
| 1            | Earlier           | Land & Construction cost, | 300, 00, 00,000       |
| 2            | Present expansion | Plant & machinery         | 157, 00, 00,000       |
| <b>TOTAL</b> |                   |                           | <b>Rs. 457 Crores</b> |

**2.7 RESOURCE REQUIREMENTS**

Requirement of various resources and utilities for the project during both the construction and operational phases are discussed in detail in the succeeding sections.

**2.7.1 CONSTRUCTION PHASE**

**RAW MATERIAL:**

The catalog of Class “A” materials proposed to be used for the construction towards project with the tentative quantity is presented in below table

**TABLE-2.9: MATERIALS DETAILS**

| <b>CONSTRUCTION MATERIAL RESOURCES</b> |                      |      |          |
|----------------------------------------|----------------------|------|----------|
| Sl. No.                                | DESCRIPTION          | UNIT | QUANTITY |
| 1.                                     | Concrete             | Cum  | 137067   |
| 2.                                     | Steel                | MT   | 14468    |
| 3.                                     | Windows              | Sqmt | 40501    |
| 4.                                     | Tiles                | Sqmt | 311272   |
| 5.                                     | Doors                | Nos. | 11730    |
| 6.                                     | Aluminium shuttering | Sqmt | 11500    |
| 7.                                     | Structural steel     | MT   | 120      |

**WATER REQUIREMENTS:**

The water utilized during the construction phase gets consumed either by the chemical reaction with cement and also partly gets evaporated. Hence, there will be no wastewater generation from curing or mixing processes. However, there will be

discharge of domestic wastewater to the tune of 7.2 KLD will be treated in septic tank followed by soak pit.

**TABLE-2.10: WATER REQUIREMENT DURING CONSTRUCTION PURPOSE**

|                                                   |                                   |
|---------------------------------------------------|-----------------------------------|
| Average Water Consumption (for Construction)      | 25 KLD                            |
| Average water Consumption (Domestic)              | 9 KLD                             |
| Total water requirement during construction phase | 34 KLD                            |
| No. of Laborers                                   | 200                               |
| Discharge of domestic wastewater                  | 7.2 KLD                           |
| Source of water for Construction                  | STP treated water from East point |
| Source of water for Domestic                      | Tanker water                      |

**SOLID WASTE GENERATION:**

Construction waste will be generated during construction works and it mainly comprises of earth, stones, bricks, inert and non-biodegradable material such as concrete, plaster, metal, wood, plastics etc & small quantity of domestic solid waste. The retrievable items such as bricks, wood, metals are recycled. Wherein the domestic waste will be segregated and will not be allowed to mix with the construction waste. The construction earth and other wastes will be reused for backfilling and road formation within the site premises. Proponents are not going to provide labour colony within the site, so there will not be any generation of domestic solid waste during the construction phase.

**TABLE-2.11: SOLID WASTE GENERATION DURING CONSTRUCTION**

|                        |                                                                                             |
|------------------------|---------------------------------------------------------------------------------------------|
| No. of Laborers        | 200                                                                                         |
| Solid waste generation | $200 \times 0.2 = 40 \text{ kg/day}$                                                        |
| Disposal               | Solid waste will be collected manually and handed over to local body for further processing |

**ENERGY REQUIREMENTS:**

The power requirement during construction phase is 200 KVA which will be temporarily met by supply from BESCOM and 1x50KVA capacity of D.G. Sets provided during construction phase.

## 2.7.2 OPERATION PHASE

### WATER REQUIREMENT:

#### Sources of Water:

During operation phase, water requirement will be drawn from the Bore well and obtained permission from Karnataka Ground Water Authority and a copy is enclosed as **Annexure-7**. The detailed total water requirement, based on type of project, number of units and other facilities to be provided, during operational phase is estimated as in below.

- Total water requirement to be considered as per NBC is 135 LPCD
- Domestic water demand (70% of total consumption) =  $135 \times 0.7 = 90$  LPCD
- Flushing water demand (30% of total consumption) =  $135 \times 0.3 = 45$  LPCD
- Reduction by 30% in domestic water consumption due to use of water efficient Sanitary Fixtures =  $90 \times 0.7 = 60$  LPCD

The total water requirement for the project during operation phase is around 1,238 KLD. It is proposed to use the treated sewage for secondary purposes such as toilet flushing to the amount of 524 KLD. Hence, the net fresh water demand would be about 714 KLD. Water balance chart during the operation phase is shown in the below Fig.

**TABLE-2.12: WATER REQUIREMENT BREAK UP**

| Sl. No.               | Description                   | Units | Occupants | Water demand, LPCD |           | Total water requirement, KLD |            |             |
|-----------------------|-------------------------------|-------|-----------|--------------------|-----------|------------------------------|------------|-------------|
|                       |                               |       |           | Domestic           | Flushing  | Domestic                     | Flushing   | Total       |
| 1                     | Tower-A                       | 312   | 1872      | 60                 | 45        | 112                          | 84         | 196         |
| 2                     | Tower-B                       | 325   | 1872      | 60                 | 45        | 112                          | 84         | 196         |
| 3                     | Tower-C                       | 336   | 1848      | 60                 | 45        | 111                          | 83         | 194         |
| 4                     | Tower-D                       | 312   | 1872      | 60                 | 45        | 112                          | 84         | 196         |
| 5                     | Tower-E                       | 475   | 2736      | 60                 | 45        | 165                          | 123        | 288         |
| 6                     | Tower-F                       | 90    | 540       | 60                 | 45        | 32                           | 24         | 56          |
| 7                     | Row house                     | 79    | 528       | 60                 | 45        | 32                           | 24         | 56          |
| 8                     | Club house                    | --    | 563       | 20                 | 15        | 11                           | 9          | 20          |
| 9                     | Visitors & Housekeeping staff |       | 592       | 45                 | 15        | 27                           | 9          | 36          |
| <b>Total - 11,831</b> |                               |       |           | <b>--</b>          | <b>--</b> | <b>714</b>                   | <b>524</b> | <b>1238</b> |



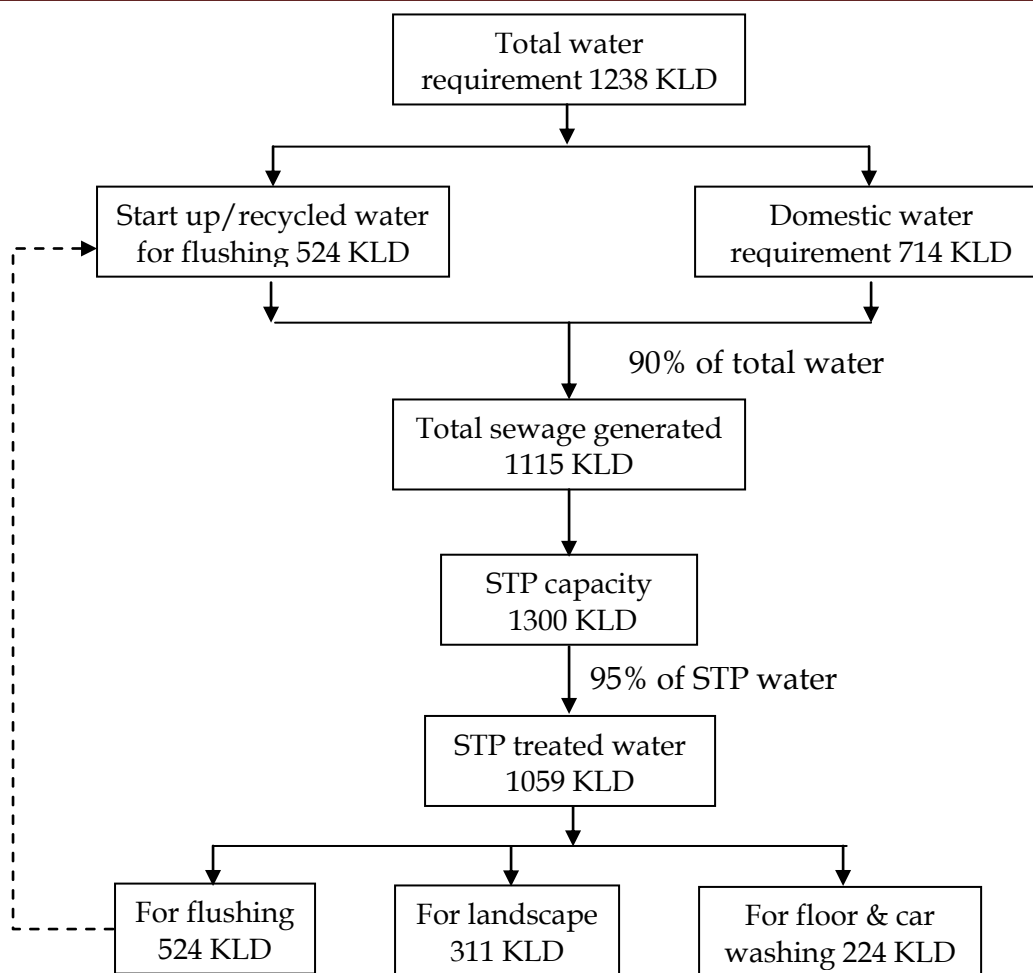


FIGURE-2.6: WATER BALANCE CHART

## SEWAGE TREATMENT PLANT

The sewage generated from the project is about 1115 KLD i.e. 90% of the domestic water requirement. This raw sewage will be treated in the STP of capacity 1300 KLD using Sequence Batch Reactor (SBR) Technology by considering 10% additional short load. The treated water will be utilized for secondary purposes like flushing, gardening and for floor & car washing. Technical report on Sewage treatment plant of 1300 KLD is attached as **Annexure-8**.

## SOLID WASTE GENERATION:

The solid wastes generated during operation phase can be categorized under four groups:

- ◆ Wet Garbage like Food waste, Lawn mowing wastes etc.
- ◆ Dry Garbage such as Paper, Plastic, Bottles, etc.

- ◆ Sludge from Sewage Treatment Plant (STP).
- ◆ Hazardous waste like CDs, used batteries etc.

**DOMESTIC/RESIDENTIAL WASTE:**

This category of waste comprises the solid wastes that originate from individual residential units. These wastes are generated as a consequence of domestic activities such as food preparation, cleaning, repairs, hobbies, redecoration, empty containers, packaging, clothing, old news papers, writing/new paper, and old furnishings etc. A nominal value estimated for Bengaluru is 0.4 kg/person/day and the same has been considered to estimate the quantity of domestic solid waste generated due to this proposed project.

**TABLE-2.13: ESTIMATION OF SOLID WASTE GENERATION**

| Sl. No.      | Description | Occupants | Per capita considered in kg/Day/person | Total Waste MT/day | Organic Waste MT/day (50%) | In-Organic Waste MT/day (50%) |
|--------------|-------------|-----------|----------------------------------------|--------------------|----------------------------|-------------------------------|
| 1            | Tower-A     | 1704      | 0.4                                    | 0.69               | 0.345                      | 0.345                         |
| 2            | Tower-B     | 1664      | 0.4                                    | 0.67               | 0.335                      | 0.335                         |
| 3            | Tower-C     | 1758      | 0.4                                    | 0.70               | 0.350                      | 0.350                         |
| 4            | Tower-D     | 1716      | 0.4                                    | 0.69               | 0.345                      | 0.345                         |
| 5            | Tower-E     | 2420      | 0.4                                    | 0.97               | 0.485                      | 0.485                         |
| 6            | Tower-F     | 540       | 0.4                                    | 0.22               | 0.11                       | 0.11                          |
| 7            | Row house   | 528       | 0.4                                    | 0.21               | 0.105                      | 0.105                         |
| 8            | Club house  | 517       | 0.1                                    | 0.05               | 0.025                      | 0.025                         |
| <b>Total</b> |             |           |                                        | <b>4.2</b>         | <b>2.1</b>                 | <b>2.1</b>                    |

**Disposal:**

The solid waste generated from the project will be collected in separate bins from each block and separated as Organic and In-Organic waste in the respective bins within the units.

**Management:**

- ✓ Organic wastes will be segregated & collected at household levels in each floor and will be processed in organic waste converter.
- ✓ The recyclable portion like paper, plastics, glass, metals etc. will be given to the waste collectors for recycling for further processing.

- ✓ STP sludge will be used as manure for gardening within the site.
- ✓ Hazardous wastes like waste oil generated from the DG sets will be stored in barrels and handed over to the authorized waste oil recyclers/processors.
- ✓ Generated E-wastes will be collected separately & handed over to the authorized & approved by KSPCB E-waste processors.

#### ENERGY REQUIREMENTS:

##### Energy requirements:

The maximum power demand estimated for the facilities will be drawn from BESCOM.

**TABLE-2.14: DETAILS OF POWER REQUIREMENT & BACKUP DETAILS**

| Sl.No | Description           | Capacity                      |
|-------|-----------------------|-------------------------------|
| 1.    | Power requirement     | 11,267 kW                     |
| 2.    | Transformers capacity | 1×630KVA, 2×500KVA, 8×1000KVA |
| 3.    | DG Sets               | 2×380KVA, 11×500KVA           |

##### Waste oil from DG:

It is estimated that the amount of waste oil generated from the DG sets would sum up to about 1 liter per running hour of DG. These wastes generated are stored in identified location in a closed leak proof containers under roof within the building premises for its safe disposal. The same is disposed to KSPCB authorized waste recyclers.

##### Energy Saving Details:

The proposed project will use the non-conventional energy source i.e. use of solar energy, which will comprise of solar heating, hence utilizing maximum solar energy. Solar water heaters will be provided for the top floors in each block. Apart from this other alternative energy efficient devices are also used and the energy saving details is depicted in below table. The overall energy savings from the proposed project is around 21%.

**TABLE-2.15: ENERGY SAVINGS DETAILS**

| Sl. No | Description                    | Savings in % |
|--------|--------------------------------|--------------|
| 1.     | Using solar energy             | 8.1          |
| 2.     | Using copper wound transformer | 1.7          |
| 3.     | Using CFL & LED lights         | 10.9         |

|                                      |                     |
|--------------------------------------|---------------------|
| <b>Percentage of saving in power</b> | <b>20.7 say 21%</b> |
|--------------------------------------|---------------------|

## **2.8 FIRE SAFETY MANAGEMENT SYSTEM**

Fire Protection scheme has been designed based on all the relevant fire safety as per NBC norms. The proposed residential apartment project is a development of 6 towers & the height of the building is 59.9 m (maximum).

The project has been designed based on all the relevant fire safety as per NBC norms.

- \* Fire extinguishers systems are deployed throughout the residential building.
- \* Fire hydrants all around the building will be provided.
- \* Fire hose cabinets will be provided at every floor.
- \* Sprinkler System, Automatic fire detection & Alarm system will be provided.

### **Precautions & safety measures proposed are:**

- ◆ Nearby Fire Station contact numbers will be displayed
- ◆ Fire water tank capacities 1×425 cum, 1×385 cum will be provided for immediate action to arrest the fire accident
- ◆ Portable fire extinguishers are proposed to be placed at Strategic locations.
- ◆ Electrical Fire Alarm system is placed at Strategic locations.
- ◆ Public Address system.
- ◆ Landing Hydrants on all floors near each staircase with necessary accessories.

## **2.9 COMPATIBILITY WITH LOCAL BUILDING REGULATIONS**

- \* As per BDA norms, for all building above 50m, all around the building set back of 16m is followed.
- \* Maximum height of the building is 59.9m
- \* Nearest fire station is located at Sarjapura fire station is at a distance of 3 Km from the project site.
- \* Existing ROW for the approach road is 12.5m.
- \* Fire driveway of 8 m wide all around the building is followed.
- \* 6.27% of total land is reserved for civic amenities/surface parking as applicable

- \* 25m buffer to tertiary nala incorporated in the site plan (considering from the edge of the nala/drain)
- \* Green area of 38.98% is earmarked in the site plan.
- \* Ground coverage permissible is 55% and achieved is 33.2%

## 2.10 ROAD CONNECTIVITY

The proposed project site is located along Gattahalli road which connects to Sarjapur Road on one side and Huskur Road on other side. Traffic impact study and its management report are enclosed in **Annexure-9**.

**TABLE-2.16: PARKING SUMMARY DETAILS**

|                                                                          |                   |
|--------------------------------------------------------------------------|-------------------|
| No. of car parks required @1/2units – (Units up to 50Sqmt of area)       | 91                |
| No. of car parks required @1/1units – (Units > 50 to <150 Sqmt of area)  | 1,668             |
| No. of car parks required @2/1units – (Units > 150 to <225 Sqmt of area) | 50                |
| No. of car parks required @3/1units – (Units > 225 to <300 Sqmt of area) | 162               |
| No. of visitors car parks required @ 10%                                 | 197               |
| <b>Total number of Car Parks required</b>                                | <b>2,168 cars</b> |
| Number of car parks provided                                             | 1,940             |
| Car parks provided on surface                                            | 240               |
| <b>Total number of Car parking provided</b>                              | <b>2,180 cars</b> |

| <b>Parking summary (Tower-A,B,C,D,E,F (Building 1-10))</b> |                       |                     |                    |              |
|------------------------------------------------------------|-----------------------|---------------------|--------------------|--------------|
| <b>Tower</b>                                               | <b>Basement Floor</b> | <b>Ground floor</b> | <b>First floor</b> | <b>Total</b> |
| Tower-A                                                    | NA                    | 158                 | 155                | 313          |
| Tower-B                                                    | NA                    | 157                 | 143                | 300          |
| Tower-C                                                    | 175                   | 119                 | NA                 | 294          |
| Tower-D                                                    | 157                   | 155                 | NA                 | 312          |
| Tower-E                                                    | 334                   | 129                 | NA                 | 463          |
| Tower-F                                                    | 100                   | 0                   | NA                 | 100          |
| Building 1-10                                              | NA                    | 158                 | NA                 | 158          |
| <b>Total car parks provided</b>                            |                       |                     |                    | <b>1,940</b> |
| <b>Parking provided on Surface</b>                         |                       |                     |                    | <b>240</b>   |
| <b>Total number of car parking provided</b>                |                       |                     |                    | <b>2,180</b> |

## CHAPTER – 3

### DESCRIPTION OF THE ENVIRONMENT

#### INTRODUCTION

Baseline data describes the existing environmental status of the identified study area with reference to the prominent environmental attributes. An area covering 10km radius, with project site as centre, is considered as the study area. The study area of 10km radius around project is covered in Survey of India topo sheet no. 57H/9, 57H/13 (1:50,000).

The existing environmental setting is considered to establish the baseline conditions which are described with respect to geology, hydrogeology, climatic & atmospheric conditions, water quality, noise quality, soil quality, vegetation pattern, ecology, land use and socioeconomic profile of people.

Collecting the baseline environmental status of the project helps to predict the magnitude of impacts that are likely to be caused due to the proposed project on different environmental components of the project in the study area. It also helps to identify critical environmental attributes required to be monitored during and after the proposed development. The site-specific primary data were monitored for the identified parameters and supplemented by the available secondary data. Baseline Environmental status is the most important study based on which probable impacts from the project are predicted. The Baseline study was conducted in the summer season during the month of April to June 2017.

In addition to the baseline environmental monitoring, field inspection in the study area, collection of secondary information for the environmental components and discussions with the officials and local public were also conducted. The baseline environmental status presented below comprises the following.

**a. Description of study area:** Project site is in the residential zone as per the CDP. The study area is 10km radius from the project site comprising of mixed land use –

residential and commercial activities. The baseline environmental status of the study area are presented in the below sections.

- ✓ Physical Environment
- ✓ Biological Environment
- ✓ Socio – Economic Environment

**b. Physical Environment:** The Components of physical environment discussed in this section includes,

**TABLE-3.1: ENVIRONMENTAL ATTRIBUTES & FREQUENCY OF MONITORING**

| Attribute                 | Parameters                                                                                                                                                                | Frequency of Monitoring                                                                                        |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| Climatology & Meteorology | Surface: Wind Speed, direction, temperature, relative humidity and rainfall                                                                                               | Surface continuous monitoring station for entire study period and also data collection from secondary sources. |
| Water Quality             | Physical, Chemical and Bacteriological Parameters                                                                                                                         | Once during the study season                                                                                   |
| Ambient Air Quality       | PM <sub>10</sub> , PM <sub>2.5</sub> , SO <sub>2</sub> , NO <sub>x</sub> , O <sub>3</sub> , Pb, CO, NH <sub>3</sub> , C <sub>6</sub> H <sub>6</sub> , BaP, As, Ni and VOC | 24 hourly twice a week for three months during study period                                                    |
| Noise Levels              | Noise Levels in db (A)                                                                                                                                                    | Hourly observations for 24 hours per location.                                                                 |
| Ecology                   | Existing terrestrial Flora and Fauna within the study area                                                                                                                | Through field visit during the study period and substantiated through secondary sources.                       |
| Soil Characteristics      | Physical & Chemical                                                                                                                                                       | Once during the season.                                                                                        |
| Land Use                  | land use change for different categories                                                                                                                                  | Data from various Government agencies                                                                          |
| Socio-economic aspects    | Socio-economic characteristics                                                                                                                                            | Census Handbooks, 2011.                                                                                        |

### 3.1. LAND ENVIRONMENT

The first feature which influence the development of a project is the existing land use pattern of the project site and neighborhood of the project, whether the proposed development conform to the development for that area or not.

An area covering 10km radius, with project site as centre, is considered as the study area. The detail study of the land environment will includes the following study areas.



- Study of land use pattern, habitation, cropping pattern, forest cover, environmental sensitive places etc, employing remote sensing techniques (if available) and ground truth and also secondary data sources.
- Study about trend of change in land use pattern, if any, with reasons thereof for the last 10 years and its extrapolation to future 10 years with and without the project.

### Topography of the study area:

The project site is located at the Southeast side from the Bengaluru city with the distance of 17 km. Portion of the land is plain and sloping towards north side and remaining land is covered by trees. An area covering 10km radius, with project site as centre, is considered as the study area. The important features within the study area are listed in table 3.2.

**TABLE-3.2: IMPORTANT FEATURES WITHIN STUDY AREA**

| Sl no. | Features       | Location                                                     | Distance      | Direction |
|--------|----------------|--------------------------------------------------------------|---------------|-----------|
| 1      | Streams/Rivers | Hadosiddapura lake                                           | 150m          | N         |
| 2      | State Boundary | Karnataka – Tamilnadu State boundary                         | 10 Km         | SW        |
| 3      | Highways       | Sarjapur Main Road                                           | 1.6 km        | N         |
| 4      | Airports       | Kempegowda International Airport                             | 35 km         | N         |
| 5      | Railway        | Carmelaram Railway Station<br>Bengaluru city Railway Station | 4 km<br>17 km | N<br>NW   |

#### 3.1.1 LAND USE PATTERN

The main objective of this section is to provide an environmental baseline status of the study area covering 10km radius around the proposed project site so that the temporal changes due to the proposed residential activity on the surroundings can be assessed.

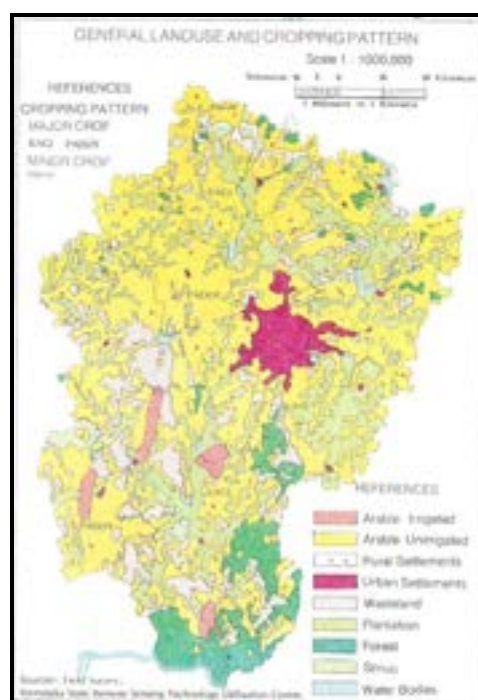
The main objectives of land use studies are:

- \* To determine the present land use pattern.
- \* To ascertain the temporal changes in land use pattern due to construction and operation phase and
- \* To scrutinize the impacts on land use due to proposed project in the study area.

The use of land is determined both by physical factors such as topography, climate, and soil types as well as human factors such as population density, technological capability, culture & tradition etc. Land use has a major impact on natural resources including water, soil, nutrients, plants and animals.

#### EXISTING LAND USE:

The proposed project site comes under the Revised Master Plan (RMP) – 2015 of BDA (Bengaluru Development Authority) for Kodathi Village, Varthur Hobli, and proposed project site is designated as Residential zone. And also land has been converted from agricultural to residential purpose.



**FIGURE-3.1: GENERAL LAND USE AND CROPPING PATTERN OF BENGALURU (URBAN & RURAL) DISTRICT (SOURCE: GSI)**

#### **3.1.2 GEOLOGICAL SETTING**

The geological setting of entire Bengaluru district is as described below, based on Taluk wise observations.

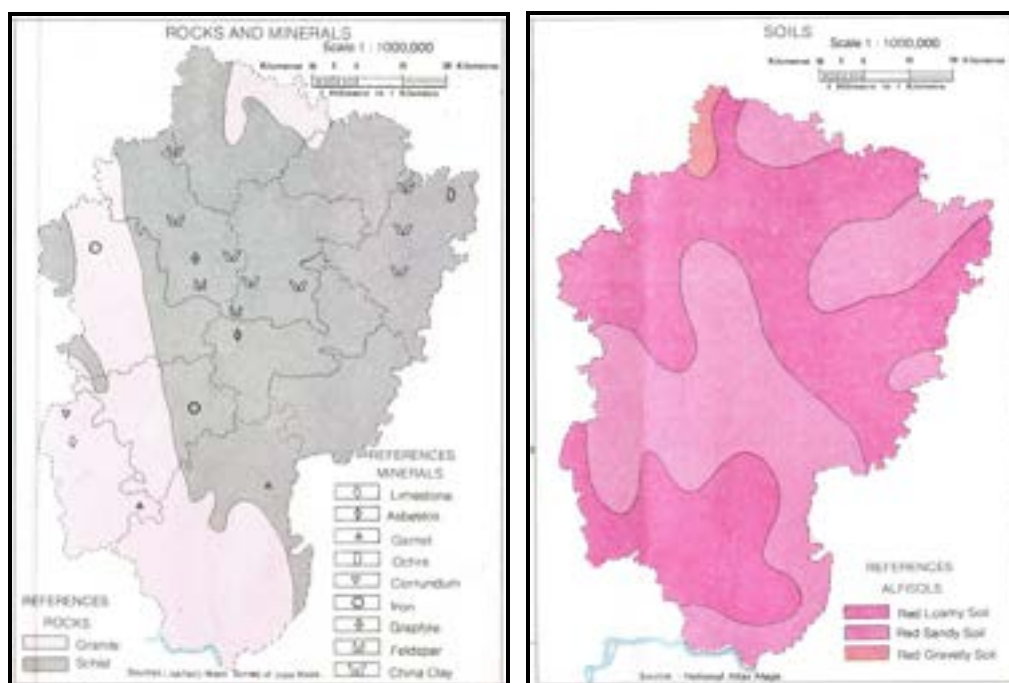
The entire Anekal Taluk is composed of only one type of rock viz. gneissic granites belonging to Precambrian age. The gneissic granites are exposed as a continuous chain of mounds raising 90 to 150 m above the general ground level on the

western portion of the Taluk. These form the Bannerghatta group of hills. Rocky outcrops are few and far between the middle and eastern portions of the Taluk. Inclusions of quartz and pegmatite veins are common. The depth of weathering varies greatly. The central and eastern portions of the Taluk show maximum thickness of the weathered mantle, extending to more than 12 m. The western portion of the taluk is deeply dissected and rocky.

The chief rock types occurring in Bengaluru North Taluk are granites and gneisses. These are prominently exposed as a ridge running NNE and SSW almost in the middle of the Taluk. The granitic gneisses are crisscrossed by pegmatitic and aplitic veins. Basic xenolithic patches are common. Banding is prominent. The rocks are highly jointed. Sheet jointing parallel to the exposed surface is particularly characteristic of the Bengaluru gneisses. On weathered surfaces, the longitudinal joints are prominently seen giving an appearance of titled beds. The regional strike is NNW-SSE with local variations. These rock formations have suffered considerable weathering particularly in the low lying areas as could be seen in the nala sections. Granites and gneisses are intruded by a number of basic dykes. Dykes are oriented east-west and as well as north-south. Cappings of laterites are found at the highest point in Bengaluru, generally above 915 m MSL. Beneath the Laterite, the gneisses are deeply weathered giving into various shades of clay. Laterite exposures are well seen near Yelahanka and neighborhood.

Bengaluru South Taluk comprises granites and granitic gneisses belonging to pre-Cambrian age. The granitic gneisses are exposed as continuous chains of mounds raising 30 to 70 m above ground level in the southern region of the Taluk. Granites are medium to coarse grained hard, compact and massive. Granitic gneisses are distinctly banded and are in various shades of gray color. The strike of foliation is usually NNW-SSE. They are traversed by pegmatitic and aplitic veins. Sheet jointing is very common. Granites and gneisses have undergone different degree of alteration and decomposition. Southern and eastern regions of the Taluk show maximum thickness of weathered mantle extending up to about 20 m while the depth of the weathered zone is maximum generally in the valleys, in highly cut-up terrain, as in the southern parts of

the Taluk. Granites and granitic gneisses are traversed by vertical and horizontal joints and are intruded by dolerite dykes. Lateritic capping is confined to higher elevations such as Whitefield and Ramagondanahalli.



**FIGURE-3.2: GEOLOGICAL SETTINGS OF BENGALURU (URBAN & RURAL) DISTRICT (SOURCE: GSI)**

Bengaluru district does not possess mineral deposits of any commercial importance. The district accounts for small deposits of a few minor minerals like clay, quartz, feldspar and ornamental and building stones. The minerals, rocks and soil distribution of Bengaluru district is presented in figure 3.3.

### 3.1.3 SOIL STRATA

Bengaluru urban district is predominantly covered by Red loamy and Laterite soil. Red loamy and sandy soils generally occur on hilly to undulating land slope on granite and gneissic terrains. The soils are light textured and are highly leached in nature with good infiltration rate. They are mainly seen in the eastern and southern parts of Bengaluru North and South Taluks. Laterite soils occur on undulating terrain forming plain to gently sloping topography of peninsular gneissic region. It is mainly covered in Anekal Taluk and western parts of Bengaluru North and South Taluks.

Soil data including type, classification, characteristics, soil properties etc., are important from engineering considerations for design of structures. Changes in parameters of soil also may affect plantation and vegetative growth, which in turn may endanger the health of local habitat.

Baseline data of the soil ascertained by way of soil investigations carried out is to be provided. Field surveys usually involve a combination of hand auger boring and drilling over the site in a systematic grid pattern, with more focus on specific areas of interest. Soil surveys should consider both the physical and engineering properties of the soil.

#### **PHYSICO-CHEMICAL CHARACTERISTICS OF THE SOIL:**

The primary objective of this investigation is to establish the Geotechnical conditions at the site, the soil sample from the proposed project site was analyzed for important parameters and the results were compared with standard classification and to evaluate the net safe bearing capacities and other geotechnical design parameters through the various field and laboratory tests. Geological investigation study conducted at the project site, report is enclosed as **Annexure-10**.

#### **LABORATORY TESTING**

Following laboratory tests were conducted on the soil samples collected from boreholes at the project site.

Tests conducted on soil samples:

- ✓ Standard Penetration test
- ✓ Gran size analysis by sieve analysis
- ✓ Determination of Specific gravity

Ground studies were conducted to identify the land use in and around 10 km radius of the site. Representative soil samples were collected from- eight sampling locations within an area of 10 km radius in and around the proposed project site for analysis of the physico chemical characteristics to assess the cropping pattern, microbial growth etc. standard procedures were followed for sampling and analysis.



Soil samples were collected at different locations (Boreholes) within the Study area; the sampling locations location's on Topo sheet are shown in figure 3.3

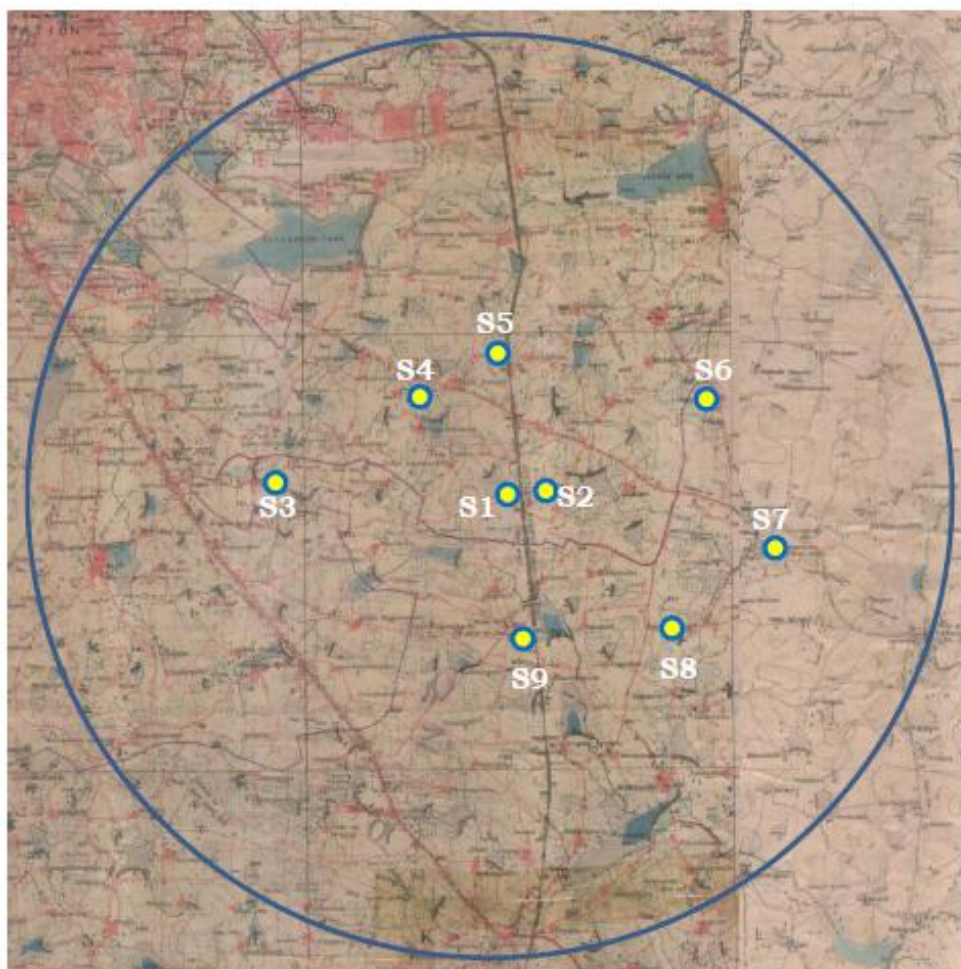


FIGURE-3.3: SOIL SAMPLING LOCATION

TABLE-3.3: SOIL SAMPLING LOCATIONS AROUND THE STUDY AREA

| Sample No. | Name of Sampling station | Distance & direction from project site | Co-ordinates                       |
|------------|--------------------------|----------------------------------------|------------------------------------|
| S1         | Project Site             | --                                     | 12° 53' 11.3" N<br>77° 42' 17.2" E |
| S2         | Kodathi                  | 1.3 km (E)                             | 12° 53' 22.2" N<br>77° 42' 55.1" E |
| S3         | Kudlu                    | 5.6 km (W)                             | 12° 53' 26.4" N<br>77° 30' 0.89" E |
| S4         | Junnasandra              | 3.2 km (NW)                            | 12° 53' 03.4" N<br>77° 40' 42.7" E |
| S5         | Kannalli                 | 3.0 km (N)                             | 12° 54' 56.0" N<br>77° 42' 09.6" E |
| S6         | Heggondahalli            | 5.5 km (NE)                            | 12° 54' 25.7" N<br>77° 44' 57.2" E |

|    |             |             |                                    |
|----|-------------|-------------|------------------------------------|
| S7 | Dommasandra | 5.3 km (SE) | 12° 52' 48.3" N<br>77° 44' 45.6" E |
| S8 | Kammasandra | 4.9 km (SE) | 12° 49' 56.9" N<br>77° 41' 26.0" E |
| S9 | Huskur      | 3.2 km (S)  | 12° 51' 41.2" N<br>77° 42' 15.4" E |

**TABLE-3.4: PHYSICO-CHEMICAL CHARACTERISTICS OF THE SOIL**

| Sl. No | Parameters                                        | S1   | S2   | S3   | S4   | S5   | S6   | S7   | S8   | S9   |
|--------|---------------------------------------------------|------|------|------|------|------|------|------|------|------|
| 1      | p <sup>H</sup> value                              | 7.41 | 7.21 | 7.12 | 7.42 | 7.30 | 7.35 | 7.32 | 7.12 | 7.42 |
| 2      | Conductivity, µs/cm                               | 684  | 512  | 482  | 527  | 536  | 593  | 544  | 497  | 661  |
| 3      | Moisture content, %                               | 30.2 | 26.2 | 26.2 | 27.0 | 26.2 | 26.8 | 26.6 | 25.9 | 26.1 |
| 4      | Organic Matter, %                                 | 0.66 | 0.65 | 0.67 | 0.60 | 0.65 | 0.65 | 0.66 | 0.66 | 0.67 |
| 5      | Available Calcium as Ca, mg/gm                    | 0.40 | 0.42 | 0.42 | 0.42 | 0.42 | 0.43 | 0.41 | 0.40 | 0.41 |
| 6      | Available Magnesium as Mg, mg/gm                  | 0.19 | 0.20 | 0.20 | 0.20 | 0.17 | 0.17 | 0.17 | 0.17 | 0.21 |
| 7      | Available Phosphate as PO <sub>4</sub> , mg/gm    | 0.10 | 0.13 | 0.12 | 0.10 | 0.12 | 0.13 | 0.11 | 0.11 | 0.11 |
| 8      | Available Potassium as K                          | 0.14 | 0.15 | 0.13 | 0.13 | 0.15 | 0.13 | 0.14 | 0.15 | 0.15 |
| 9      | Water Extractable Chloride as Cl, mg/gm           | 0.27 | 0.28 | 0.21 | 0.25 | 0.25 | 0.24 | 0.24 | 0.23 | 0.24 |
| 10     | Water Soluble Sulphate as SO <sub>4</sub> , mg/gm | 0.10 | 0.11 | 0.11 | 0.09 | 0.10 | 0.09 | 0.09 | 0.09 | 0.10 |
| 11     | Nitrogen Kjeldhal as N*, mg/gm                    | 0.14 | 0.15 | 0.14 | 0.15 | 0.13 | 0.13 | 0.14 | 0.14 | 0.14 |
| 12     | Available Sodium as Na, mg/gm                     | 0.14 | 0.16 | 0.16 | 0.16 | 0.15 | 0.16 | 0.16 | 0.14 | 0.15 |
| 13     | Lead as Pb, mg/gm                                 | ND   | ND   | ND   | ND   | ND   | ND   | ND   | ND   | ND   |

### 3.2 WATER ENVIRONMENT

Water environment includes two environmental settings, i.e. ground water and surface water. Baseline data with regard to these environmental settings should be generated. Selected water quality parameters of ground water resources and surface water resources within 5km radius of the study area have been studied for assessing the hydrological environment to evaluate anticipated impact of the proposed residential development. It also assists to identify critical issues with a view to suggest appropriate mitigation measures for implementation.



The significant representative sampling locations for ground water and surface water are chosen through reconnaissance of project area to determine the pre-project status of the water quality in the study area. Physico-chemical and biological parameters having relevance to public health and aesthetic significance are selected to assess the water quality status with special attention to raw water resources for proposed project. The standard methods prescribed for surface, groundwater sampling as well as the analytical procedures for individual parameters is followed in this study.

### 3.2.1 GROUND WATER TABLE

Ground water in the district occurs under water table conditions in the weathered mantle of the granitic gneisses and in the joints, cracks and crevices of the basement rock. The depth to water though dependent on topography, shows variation depending on the depth of weathering. The depth to water in the low lying areas ranges from one to three meters and some of the wells in the valleys start overflowing in the rainy seasons. The depth to water may be as high as ten meters. Main source of ground water is through infiltration of rainwater. Taking note of the climatic water balance, soil characteristics, fluctuation in water tables etc., it is estimated that surface run off and evapotranspiration account for nearly 80% allowing only 20% of rainfall to recharge the ground water body.



FIGURE-3.4: IRRIGATION & HYDROLOGY (SOURCE: GSI)

### 3.2.2 SURFACE WATER QUALITY

Hadosiddapura Lake is 150 meter from the North side boundary of the project site. Water from Hadosiddapura Lake is sampled using grab sampling technique and analyzed for various chemical and physical parameters. The results are listed in below table. The sewage from household and effluents from the STP's are been discharged into these lakes, hence the water quality is too deteriorated. The water from the lake is used for agriculture and cattle washing. Since water from the lake is not used for domestic.

### 3.2.3 WATER QUALITY

To establish the baseline status of water environment, existing representative sampling locations for surface water and ground water within a radial distance of 5Km radial from the site, have been selected as per CPCB guidelines of Water Quality Monitoring through an adequate survey of the project area. The prevailing status of water quality at eight sampling locations each for ground water and surface water has been assessed during April to June, 2017.

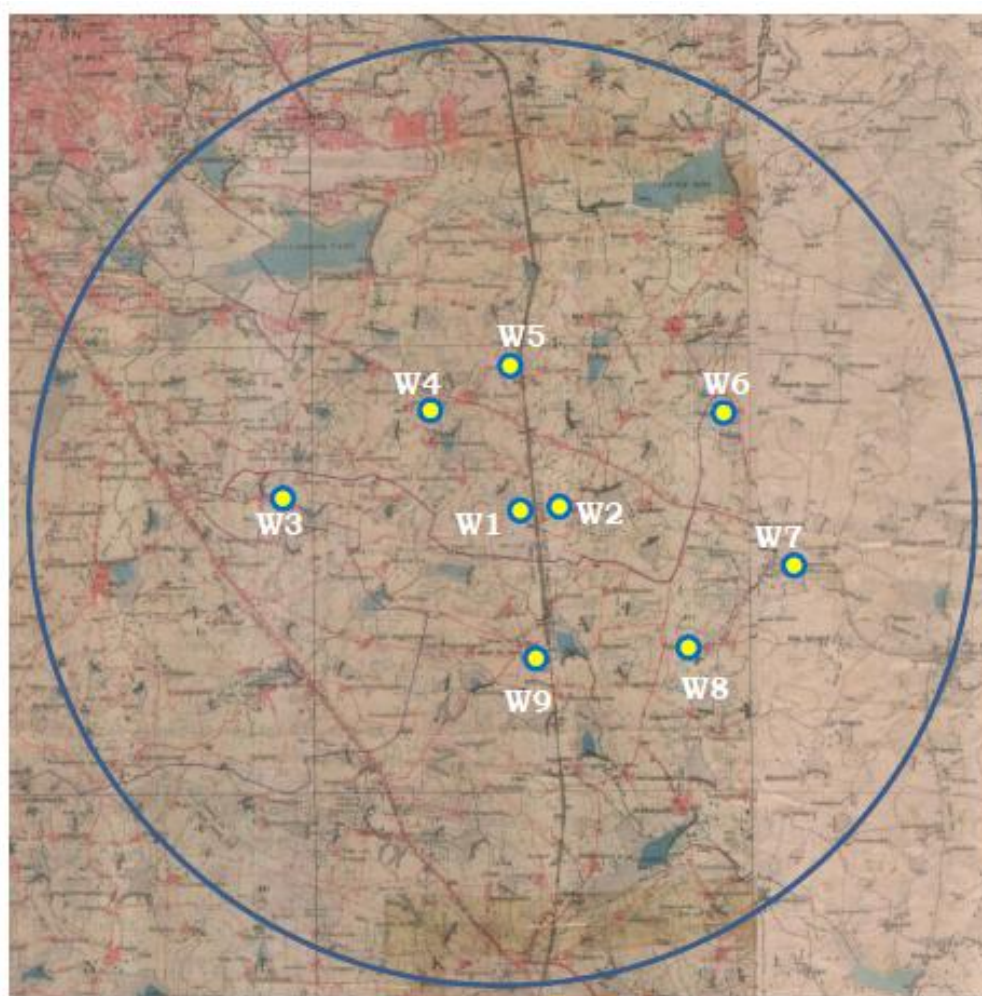
Grab samples were collected once during the study period. Physico-chemical and microbiological parameters have been analyzed to establish the baseline status of ground water resources in the study area. Methods as per IS (IS 10500:2012) were adopted for analysis of these parameters. The sampling protocol specified in the Guidelines for Water Quality Management, of CPCB was followed for sampling, preservation and transport of samples to the lab.

Following are the water quality monitoring stations where the water samples were collected for analysis during the study period.

TABLE-3.5: WATER SAMPLING LOCATIONS

| Sample No. | Name of Sampling station | Distance & direction from project site | Co-ordinates                       | Source    |
|------------|--------------------------|----------------------------------------|------------------------------------|-----------|
| W1         | Project Site             | --                                     | 12° 53' 11.3" N<br>77° 42' 17.2" E | Bore well |
| W2         | Kodathi                  | 1.3 km (E)                             | 12° 53' 22.2" N<br>77° 42' 55.1" E | Bore well |

|     |                    |             |                                    |           |
|-----|--------------------|-------------|------------------------------------|-----------|
| W3  | Kudlu              | 5.6 km (W)  | 12° 53' 26.4" N<br>77° 30' 0.89" E | Bore well |
| W4  | Junnasandra        | 3.2 km (NW) | 12° 53' 03.4" N<br>77° 40' 42.7" E | Bore well |
| W5  | Kannalli           | 3.0 km (N)  | 12° 54' 56.0" N<br>77° 42' 09.6" E | Bore well |
| W6  | Heggondahalli      | 5.5 km (NE) | 12° 54' 25.7" N<br>77° 44' 57.2" E | Bore well |
| W7  | Dommasandra        | 5.3 km (SE) | 12° 52' 48.3" N<br>77° 44' 45.6" E | Bore well |
| W8  | Kammasandra        | 4.9 km (SE) | 12° 49' 56.9" N<br>77° 41' 26.0" E | Bore well |
| W9  | Huskur             | 3.2 km (S)  | 12° 51' 41.2" N<br>77° 42' 15.4" E | Bore well |
| W10 | Hadosiddapura Lake | 150m (N)    | --                                 | Lake      |



**FIGURE-3.5: WATER SAMPLING LOCATIONS**

TABLE-3.6: GROUND WATER QUALITIES STANDARDS

| Sl. No | Parameter                                                       | Maximum Desirable Limit<br>IS 10500: 2012 | Maximum Permissible Limit<br>IS 10500: 2012 | Protocol                      |
|--------|-----------------------------------------------------------------|-------------------------------------------|---------------------------------------------|-------------------------------|
| 1      | Colour (Hazen units)                                            | 5                                         | 15                                          | IS 3025 (Part- 4): 1983       |
| 2      | Odour                                                           | Unobjectionable                           | Unobjectionable                             | IS 3025 (Part- 5): 1983       |
| 3      | Taste                                                           | Agreeable                                 | Agreeable                                   | IS 3025 (Part- 8): 1984       |
| 4      | pH Value                                                        | 6.5 to 8.5                                | No Relaxation                               | IS 3025 (Part- 11): 1983      |
| 5      | Turbidity, NTU                                                  | 1                                         | 5                                           | IS 3025 (Part- 10): 1984      |
| 6      | Chlorides as Cl, mg/l                                           | 250                                       | 1000                                        | IS 3025 (Part- 32): 1988      |
| 7      | Total Hardness as CaCO <sub>3</sub> ,<br>mg/l                   | 200                                       | 600                                         | IS 3025 (Part- 21): 2009      |
| 8      | Calcium as Ca, mg/l                                             | 75                                        | 200                                         | IS 3025 (Part- 40): 1991      |
| 9      | Magnesium as Mg, mg/l                                           | 30                                        | 100                                         | IS 3025 (Part- 46): 1994      |
| 10     | Dissolved solids mg/l                                           | 500                                       | 2000                                        | IS 3025 (Part- 16): 1984      |
| 11     | Sulphate as SO <sub>4</sub> , mg/l                              | 200                                       | 400                                         | IS 3025 (Part- 24): 1986      |
| 12     | Fluoride as F, mg/l                                             | 1.0                                       | 1.5                                         | APHA 22 <sup>nd</sup> Edition |
| 13     | Chromium as Cr <sup>+</sup> , mg/l                              | 0.05                                      | No relaxation                               | IS 3025 (Part- 52): 2003      |
| 14     | Residual free chlorine, mg/l                                    | 0.2                                       | 1                                           | IS 3025 (Part- 26): 1986      |
| 15     | Alkalinity as CaCO <sub>3</sub> , mg/l                          | 200                                       | 600                                         | IS 3025 (Part- 23): 1986      |
| 16     | Nitrate as NO <sub>3</sub> , mg/l                               | 45                                        | No Relaxation                               | IS 3025 (Part- 34): 1988      |
| 17     | Copper as Cu, mg/l                                              | 0.05                                      | 1.5                                         | IS 3025 (Part- 42): 1992      |
| 18     | Iron as Fe, mg/l                                                | 0.3                                       | No Relaxation                               | IS 3025 (Part- 53): 2003      |
| 19     | Manganese as Mn, mg/l                                           | 0.1                                       | 0.3                                         | IS 3025 (Part- 59): 2006      |
| 20     | Phenolic Compounds as C <sub>6</sub><br>H <sub>5</sub> OH, mg/l | 0.001                                     | 0.002                                       | IS 3025 (Part- 43): 1992      |
| 21     | Mercury as Hg, mg/l                                             | 0.001                                     | No relaxation                               | IS 3025 (Part- 48): 1994      |
| 22     | Cadmium as Cd, mg/l                                             | 0.003                                     | No relaxation                               | IS 3025 (Part- 41): 1992      |
| 23     | Selenium as Se, mg/l                                            | 0.01                                      | No relaxation                               | IS 3025 (Part- 56): 2003      |
| 24     | Arsenic as As, mg/l                                             | 0.01                                      | No relaxation                               | IS 3025 (Part- 37): 1988      |
| 25     | Cyanide as CN, mg/l                                             | 0.05                                      | No relaxation                               | APHA 22 <sup>nd</sup> Edition |
| 26     | Lead as Pb, mg/l                                                | 0.01                                      | No relaxation                               | IS 3025 (Part- 47): 1994      |
| 27     | Zinc as Zn, mg/l                                                | 5                                         | 15                                          | IS 3025 (Part- 49): 1994      |
| 28     | Anionic detergents as<br>MBAS, mg/l                             | 0.2                                       | 1.0                                         | Annex K of IS: 13428:<br>2005 |
| 29     | Aluminium as Al, mg/l                                           | 0.03                                      | 0.2                                         | IS 3025 (Part- 55): 2003      |
| 30     | Boron as B, mg/l                                                | 0.5                                       | 1.0                                         | APHA 22 <sup>nd</sup> Edition |

TABLE-3.7: BASELINE GROUND WATER QUALITY IN THE SAMPLING LOCATIONS

| Sl.No | Parameter                                     | W1        | W2        | W3        | W4        | W5        | W6        | W7        | W8        | W9        |
|-------|-----------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1     | Colour (Hazen units)                          | <2.0      | <2.0      | <2.0      | <2.0      | <2.0      | <2.0      | <2.0      | <2.0      | <2.0      |
| 2     | Odour                                         | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable |
| 3     | p <sup>H</sup> Value                          | 7.5       | 7.9       | 7.1       | 7.2       | 7.4       | 7.3       | 6.9       | 6.7       | 7.6       |
| 4     | Turbidity, NTU                                | 1.8       | 1.6       | 1.8       | 2.2       | 2         | 1         | 1.7       | 1.8       | 1.2       |
| 5     | Conductivity, µs/cm                           | 1026      | 1852      | 1540      | 2102      | 2029      | 1688      | 1958      | 2384      | 2001      |
| 6     | Dissolved solids, mg/l                        | 648       | 716       | 679       | 733       | 790       | 832       | 764       | 640       | 710       |
| 7     | Alkalinity as CaCO <sub>3</sub> , mg/l        | 48        | 87        | 67        | 71        | 56        | 48        | 60        | 56        | 78        |
| 8     | Total Hardness<br>as CaCO <sub>3</sub> , mg/l | 310       | 428       | 350       | 496       | 480       | 400       | 432       | 524       | 460       |
| 9     | Calcium as Ca, mg/l                           | 66        | 120       | 84        | 86        | 84        | 79        | 107.2     | 136       | 108       |
| 10    | Magnesium as Mg, mg/l                         | 20.7      | 22.3      | 34.02     | 25.3      | 26.2      | 31.1      | 39.8      | 44.7      | 26.2      |
| 11    | Chlorides as Cl, mg/l                         | 272.1     | 281.3     | 254.1     | 449.2     | 431       | 294.9     | 322.2     | 408.4     | 308.5     |
| 12    | Sulphate as SO <sub>4</sub> , mg/l            | 38.4      | 45.6      | 33.4      | 48.4      | 30.2      | 28.6      | 21.6      | 26.2      | 19.4      |
| 13    | Nitrate as NO <sub>3</sub> , mg/l             | 8.9       | 7.9       | 9.3       | 11.1      | 9.1       | 7.5       | 7.5       | 6.8       | 13.2      |
| 14    | Fluoride as F, mg/l                           | 0.6       | 0.7       | 0.8       | 0.7       | 0.8       | 0.6       | 0.8       | 0.6       | 0.6       |
| 15    | Iron as Fe, mg/l                              | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     |
| 16    | Residual free chlorine, mg/l                  | <0.2      | <0.2      | <0.2      | <0.2      | <0.2      | <0.2      | <0.2      | <0.2      | <0.2      |
| 17    | Chromium as Cr <sup>+</sup> , mg/l            | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     |
| 18    | Copper as Cu, mg/l                            | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     |
| 19    | Manganese as Mn, mg/l                         | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     |
| 20    | Mercury as Hg, mg/l                           | <0.005    | <0.005    | <0.005    | <0.005    | <0.005    | <0.005    | <0.005    | <0.005    | <0.005    |
| 21    | Cadmium as Cd, mg/l                           | <0.01     | <0.01     | <0.01     | <0.01     | <0.01     | <0.01     | <0.01     | <0.01     | <0.01     |
| 22    | Arsenic as As, mg/l                           | <0.005    | <0.005    | <0.005    | <0.005    | <0.005    | <0.005    | <0.005    | <0.005    | <0.005    |
| 23    | Cyanide as CN, mg/l                           | Absent    | Absent    | Absent    | Absent    | Absent    | Absent    | Absent    | Absent    | Absent    |
| 24    | Lead as Pb, mg/l                              | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     |
| 25    | Zinc as Zn, mg/l                              | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     |
| 26    | Boron as B, mg/l                              | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     | <0.05     |

|    |                                                                 |        |        |        |        |        |        |        |        |        |
|----|-----------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 27 | Aluminium as Al, mg/l                                           | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 28 | Selenium as Se, mg/l                                            | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 29 | Phenolic Compounds<br>as C <sub>6</sub> H <sub>5</sub> OH, mg/l | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent |

**TABLE-3.8: BASELINE SURFACE WATER QUALITY IN THE SAMPLING LOCATION**

| <b>Hadosiddapura Lake</b> |                               |                      |
|---------------------------|-------------------------------|----------------------|
|                           | <b>Parameters</b>             | <b>Surface Water</b> |
| <b>1</b>                  | <b>Color</b>                  | Light green          |
| <b>2</b>                  | <b>Odour</b>                  | Fishy                |
| <b>3</b>                  | <b>pH value</b>               | 7.01                 |
| <b>4</b>                  | <b>Turbidity</b>              | 9.2                  |
| <b>5</b>                  | <b>Conductivity</b>           | 687                  |
| <b>6</b>                  | <b>Total Dissolved Solids</b> | 410                  |
| <b>7</b>                  | <b>Total Alkalinity</b>       | 64                   |
| <b>8</b>                  | <b>Chloride</b>               | 114                  |
| <b>9</b>                  | <b>Total Hardness</b>         | 148                  |
| <b>10</b>                 | <b>Calcium as Ca</b>          | 57.6                 |
| <b>11</b>                 | <b>Magnesium as Mg</b>        | 25.3                 |
| <b>12</b>                 | <b>Sulphate</b>               | 29.6                 |
| <b>13</b>                 | <b>Fluoride</b>               | <0.1                 |
| <b>14</b>                 | <b>Iron</b>                   | 0.01                 |
| <b>15</b>                 | <b>Nitrate</b>                | 13.9                 |
| <b>16</b>                 | <b>TSS</b>                    | 16                   |
| <b>17</b>                 | <b>DO</b>                     | 4.2                  |



### **3.3 AIR ENVIRONMENT**

#### **3.3.1 LOCAL METEOROLOGY**

The meteorological data recorded during the study period is very useful for proper interpretation of the baseline information and selection of air quality monitoring locations. Historical data on meteorological parameters will also play an important role in identifying the general meteorological regime of the region.

The representative months for climate are divided into four seasons: winter lasts from January to February, summer lasts from March to May, South-West monsoon rains from June to September and North-East monsoon rains from October to December. (Ref: Assessment of Impact to Air Environment: Guidelines for Conducting Air Quality Modelling, Central Pollution Control Board).

#### **OBJECTIVE:**

The prime objective of the baseline air monitoring is to evaluate the existing air quality of the study area. This will also be useful for assessing the conformity to standards of ambient air quality during the operation phase.

This section describes the selection of sampling locations, methodology adopted for sampling, analytical techniques. The results of monitoring carried out during study period are presented in table 3.11.

#### **METHODOLOGY:**

The methodology adopted for monitoring surface weather parameters is as per the norms laid down by Bureau of Indian Standards (IS:8829) and India Meteorological Department (IMD). The study of micro-meteorological conditions of a particular region is of utmost importance to understand the variations in ambient air quality status in that region. The prevailing micrometeorology at project site plays a crucial role in transport and dispersion of air pollutants released from the pollution sources. The persistence of the predominant wind direction and wind speed at the project site will decide the direction and extent of the air pollution impact zone.



Secondary information on meteorological conditions for the project study region was collected from the IMD station at Bangalore. Data of previous years have been collected and analyzed. Meteorological parameters such as wind speed, wind direction, maximum, and minimum temperatures, Relative humidity, atmospheric pressure, recorded on monthly basis continuously covering the entire months. Wind speed & Wind direction data recorded during the study period were used for computation of relative percentage frequencies of different wind directions. The meteorological data thus collected has been used for interpretation of the existing Ambient Air Quality status, and the same data has been used for prediction of impacts of future scenario due to the activities of the proposed scheme.

The wind rose generated from the Meteorological data collected from IMD Bengaluru is shown in the following figure 3.6. From the wind rose diagram it can be observed that the predominant wind direction is blowing towards Southwest.

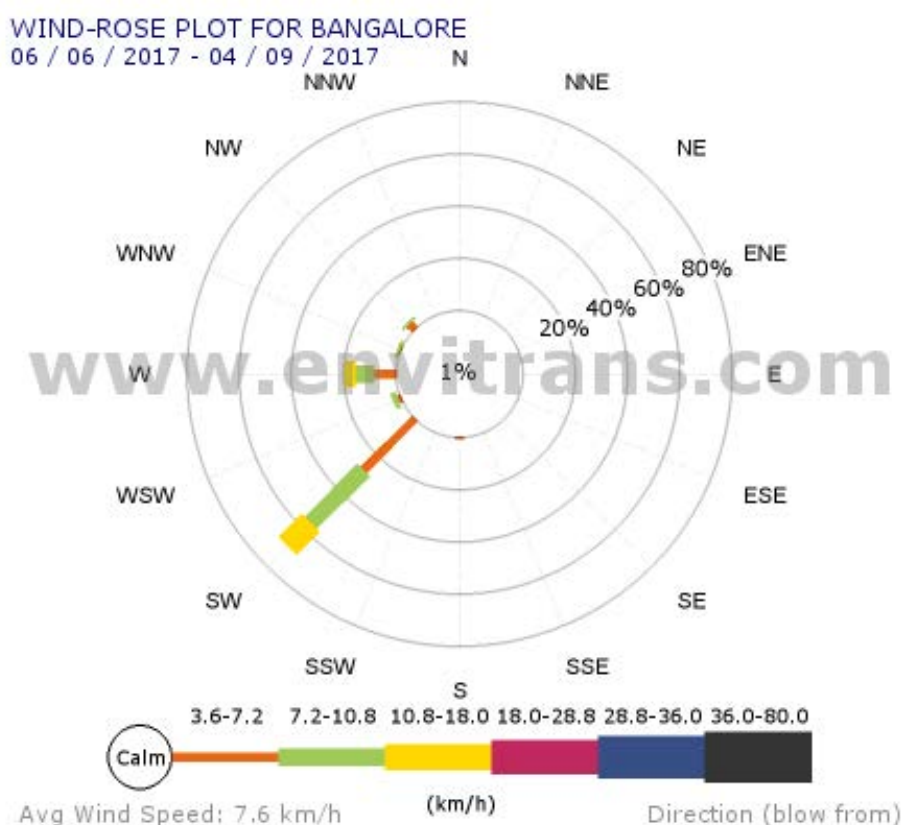


FIGURE-3.6: WIND ROSE DIAGRAM

**3.3.2 CLIMATOLOGY AND METEOROLOGY****TEMPERATURE:**

The records of the City Central Observatory may be taken as representative of the meteorological conditions in the district in general as they pertain to long period. The mean monthly values of air temperature were obtained by taking the half-sums of the mean maximum and mean minimum temperatures. On the basis of mean monthly temperatures, April is usually the hottest month with the mean daily maximum temperature at 33.4°C and the mean daily minimum at 21.2°C. On individual days, in hot seasons, the temperatures often go above 36°C. With the onset of the monsoon early in June, there is appreciable drop in the day temperatures but that in night temperature is only slight. In October, the temperatures are as in the south-west monsoon season. Thereafter temperature decreases. December is generally the coolest month with the mean daily maximum temperature at 25.7°C and the mean daily minimum at 15.3°C. Nights during January are however slightly colder than during December. On individual days during the period December to February, the minimum temperature drops down to about 8°C. The highest maximum temperature recorded at Bengaluru is 38.9°C on 1931 May, 22. The lowest minimum was 7.8°C on 1884 January, 13. The mean annual range of temperature (defined as mean temperature of the warmest month minus the mean temperature of the coolest month) is only about 7°C. The curves of mean monthly maximum and minimum temperature indicate that the mean maximum temperature is the highest in April (36.2°C) and the mean minimum temperature is the lowest in January (11.4°C). Thus the mean of the extreme annual range of the temperature is i.e. of the difference between the highest and lowest temperature recorded in a year is about 24°C. The monthly mean diurnal range of temperature is maximum (about 15°C) in February-March and minimum in July-August (about 9°C). The maximum temperature of the day occurs at about 3 p.m. and the minimum temperature at about 6 a.m. except from May to July when it occurs about an hour or so earlier. The temperature at 9-30 a.m. and 9 p.m. is the mean temperature of normal day within half a degree Celsius.

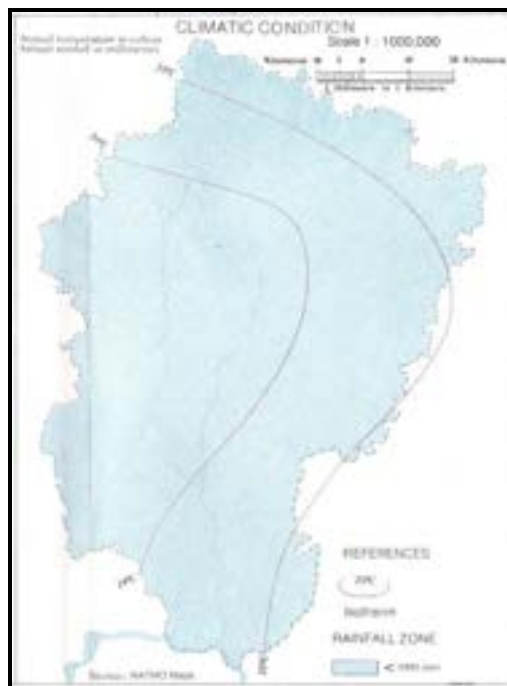
**RELATIVE HUMIDITY:**

The humidity aspect of climate is a crucial study depending on the nature and purposes of the activity through almost in all cases low relative humidity are most desirable. The mean monthly relative humidity is the lowest in the month of March (44%), the morning and evening observations being 63% and 24% respectively. Relative humidity is high during the period June to October, being between 80% and 85% on the average. Humidity decreases thereafter and in the period February to April, the air is comparatively drier, the afternoon relative humidity being 25% to 35%. From May, the relative humidity increases. The maximum relative humidity during the day occurs at about 6 a.m. and the minimum at about 3 p.m. The total annual range between the maximum morning and minimum evening observations is 64% which is of significance in several industrial operations such as textiles, plastics, fertilizers, etc. the vapour pressure which represents the absolute moisture content of the atmosphere is however minimum in January, being equal to 12 mm. The largest number of hours of bright sunshine (9.5 hours) occurs in February-March. The number of sunshine hours decreases in later months reaching a minimum of 3.8 hours in July and increases later. The decrease in the sunshine hours between May and June by about 3.9 hours is the most marked.

**RAINFALL:**

The average annual rainfall observed based on the 10 years IMD data is 979.8mm. Bengaluru has three different rainy periods covering eight months of the year followed closely one after the other. Of these, June to September is the principal rainy season. The annual variation of rainfall shows two maxima and two minima. The principal maximum is in September and the secondary maximum in May. These are also the months with the maximum frequency of thunderstorms. Bengaluru receives 54% of the total annual rainfall in the south-west monsoon period (June to September) with a rainfall of 496 mm and 34 rainy days. The rainfall increases from June to September. During the north-east monsoon period, the mean rainfall is 241 mm which is a quarter of the annual total rainfall and the mean number of rainy days is 14. Thus

about 80% of the annual rainfall falls during the six months June to November. In April-May, the mean rainfall is 156 mm and the number of rainy days is 10. December to March is a comparatively rainless period, with a mean rainfall of 33mm and about 3 rainy days.



**FIGURE-3.7: TEMPERATURE AND RAINFALL PATTERN (SOURCE: GSI)**

#### **WIND:**

The surface winds over a Bengaluru have a fairly clear cut seasonal character with easterly components predominating in one period and westerly component in the other. During the period May to September, the winds are WSW to W while during the period from November to March, they are ENE to ESE. April and October are transition months when the change over from the easterly to the westerly wind regime and vice versa take place. The annual variation of the monthly mean wind speed shows two maxima and minima. The primary minimum is in July when the westerly winds are prominent, with a mean speed of is about 17 kmph and the secondary maximum in January when the easterly winds are prominent, with a mean speed of about 10 kmph. The two minima occur in the two transition months, April and October when the mean velocity is about 8-9 kmph. The diurnal variation of wind speed also shows two

maxima and minima. The principal maximum occurs generally between mid-day and 2 p.m. and the principal minimum between 4 and 6 a.m. The subsidiary minimum occurs between 7 and 9 a.m. The diurnal variation in wind direction is not prominent during June to September when the direction is mainly WSW or in November to February. The direction is mainly ENE in November, ENE to E in December and January and ESE to E in February. In March and April, winds have a slight southerly component in the morning and night after 6 p.m. and northerly component in the morning. The highest wind speed recorded so far is 106 kmph at 3.20 p.m. in a squall from NE on May 1950. Two other severe squalls occurred on 10 May 1948 and 26 May 1947 when the highest wind speed reached was 102 and 99 kmph respectively. The mean daily wind speeds in kmph at Bengaluru (based on the data 1969-80, height of sensor 19.2 m above ground level) are as follows. January 8.8, February 8.3, March 7.8, April 6.8, May 9.2, June 13.1, July 13.3, August 12.4, September 8.6, October 7.1, November 7.7, December 9.2 and Annual 9.4.

Note: Sourced from gazetteer of India & IMD, Bengaluru district.

**TABLE-3.9: HUMIDITY RAINFALL & TEMPERATURE**

| Month     | Average Minimum Temperatures in Bangalore, India (°C) | Average Maximum Temperature in Bangalore, India (°C) | Bangalore Average Temperature (°C) | Average Precipitation /Rainfall mm | Wet Days (>0.1 mm) | Average Sunlight Hours/ Day | Relative Humidity (%) |
|-----------|-------------------------------------------------------|------------------------------------------------------|------------------------------------|------------------------------------|--------------------|-----------------------------|-----------------------|
| January   | 15                                                    | 27                                                   | 21                                 | 3                                  | 1                  | 8.6                         | 59                    |
| February  | 17                                                    | 30                                                   | 23.5                               | 10                                 | 1                  | 9.1                         | 47                    |
| March     | 19                                                    | 32                                                   | 26                                 | 6                                  | 1                  | 9.5                         | 43.0                  |
| April     | 21                                                    | 33                                                   | 27                                 | 46                                 | 5                  | 8.6                         | 51                    |
| May       | 21                                                    | 33                                                   | 27                                 | 117                                | 11                 | 7.4                         | 61                    |
| June      | 20                                                    | 29                                                   | 25                                 | 80                                 | 13                 | 4.8                         | 73                    |
| July      | 19                                                    | 27                                                   | 23                                 | 117                                | 18                 | 3.0                         | 78                    |
| August    | 19                                                    | 27                                                   | 23                                 | 147                                | 18                 | 4.1                         | 77                    |
| September | 19                                                    | 28                                                   | 24                                 | 143                                | 15                 | 5.2                         | 75                    |
| October   | 19                                                    | 28                                                   | 24                                 | 185                                | 15                 | 5.6                         | 74                    |
| November  | 17                                                    | 26                                                   | 22                                 | 54                                 | 7                  | 7.2                         | 69                    |
| December  | 15                                                    | 26                                                   | 20.5                               | 16                                 | 3                  | 7.9                         | 65                    |

### **3.3.3 AMBIENT AIR QUALITY MONITORING**

The major objective of baseline air monitoring is to evaluate the existing air quality of the area. Formulation of baseline Ambient Air Quality (AAQ) data of the study area occupies a significant role in the Environmental Impact Assessment studies in assessing the conformity to standards of the ambient air quality during the construction and operation of the proposed project.

#### **RECONNAISSANCE:**

The predominant monsoon winds persisting in India dictates the transport and dispersion of air pollutants during different seasons. As per the Climatological conditions prevailing in India, the seasons accounted for carrying out air pollution studies are winter, summer and post-monsoon seasons. After reconnaissance of the area and observing the topographical features and review of the available meteorological data and local conditions the sampling sites were chosen which will be the representative of the local areas under study.

A preliminary survey was conducted at 8 AAQM locations along with the project site (within the radius of 5Kms) that were chosen based on the well-designed ambient air quality stations network. The baseline status of air environment has been assessed through ambient air quality monitoring (AAQM) network covering 8 sampling locations considered based on the following criteria:

- Micrometeorological conditions-Persistence of wind direction and speed, atmospheric stability
- Predominant upwind and downwind directions
- Identification of regional background
- Location of industries, their emission magnitude and topography of the study area.
- Determination of sensitive receptors such as hospitals, schools, thickly populated residential localities.
- Consideration of all the major conventional air pollution parameters as per latest NAAQS (National Ambient Air Quality Standards)



An intensive monitoring was carried out as per CPCB guidelines (twice a week sampling and 24 hour continuous sampling) to generate the baseline monitoring status of air environment within the study area during the period of April to June 2017.

The ambient air quality has been monitored for all the parameters as per NAAQS notified on 16<sup>th</sup> September, 2009. The major air pollutants monitored on 24 hourly bases are, Particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub> µg/m<sup>3</sup>), Sulfur dioxide and oxides of Nitrogen. Sampling and analysis of the above variables is according to the guidelines of Central Pollution Control Board. Following are the air quality monitoring stations which were identified during the study period.

### **3.3.4 AMBIENT AIR QUALITY STATUS**

The prime objective of baseline air quality survey was to assess the existing air quality of the project site. This study will also be useful for conformity to standards of the ambient air quality during the project operations.

This section describes the selection of sampling locations, methodology & analytical techniques adopted for sampling. The ambient air quality was monitored at five locations in and around the proposed project site. The air quality monitoring was conducted as per revised NAAQ standards 2009.

#### **SAMPLING AND ANALYTICAL TECHNIQUES:**

Following methodology adopted for the analysis of the various parameters at the sampling locations:

**TABLE-3.10: AIR ANALYSIS METHOD**

| <b>Sl. No.</b> | <b>Test Parameters</b>                   | <b>Test Method</b>                 |
|----------------|------------------------------------------|------------------------------------|
| 1.             | Sulphur dioxide (SO <sub>2</sub> )       | Modified West and Gaeke method     |
| 2.             | Nitrogen dioxide (NO <sub>2</sub> )      | Modified Jacob & Hochheiser method |
| 3.             | Particulate Matter 10 µg/m <sup>3</sup>  | Gravimetric method                 |
| 4.             | Particulate Matter 2.5 µg/m <sup>3</sup> | Gravimetric method                 |
| 5.             | Ozone (O <sub>3</sub> )                  | Direct Instrument Reading          |
| 6.             | Lead (Pb)                                | AAS method                         |

|     |                                                 |                                 |
|-----|-------------------------------------------------|---------------------------------|
| 7.  | Carbon Monoxide (CO)                            | Direct Instrument Reading       |
| 8.  | Ammonia (NH <sub>3</sub> )                      | Spectrophotometric method       |
| 9.  | Benzene (C <sub>6</sub> H <sub>6</sub> )        | Gas Chromatography method       |
| 10. | Benzo (a) Pyrene (BaP) – particulate phase only | Solvent extraction by GC method |
| 11. | Arsenic (As)                                    | AAS method                      |
| 12. | Nickel (Ni)                                     | AAS method                      |

Note: AAS – Atomic Absorption Spectro-photometric Method

Following are the air quality monitoring stations which were identified for the AAQ study within the study area.

**TABLE-3.11: AMBIENT AIR QUALITY MONITORING LOCATIONS**

| Sample No. | Name of Sampling station | Distance & direction from project site | Co-ordinates                       |
|------------|--------------------------|----------------------------------------|------------------------------------|
| A1         | Project Site             | --                                     | 12° 53' 11.3" N<br>77° 42' 17.2" E |
| A2         | Kodathi                  | 1.3 km (E)                             | 12° 53' 22.2" N<br>77° 42' 55.1" E |
| A3         | Kudlu                    | 5.6 km (W)                             | 12° 53' 26.4" N<br>77° 30' 0.89" E |
| A4         | Junnasandra              | 3.2 km (NW)                            | 12° 53' 03.4" N<br>77° 40' 42.7" E |
| A5         | Kannalli                 | 3.0 km (N)                             | 12° 54' 56.0" N<br>77° 42' 09.6" E |
| A6         | Heggondahalli            | 5.5 km (NE)                            | 12° 54' 25.7" N<br>77° 44' 57.2" E |
| A7         | Dommasandra              | 5.3 km (SE)                            | 12° 52' 48.3" N<br>77° 44' 45.6" E |
| A8         | Kammasandra              | 4.9 km (SE)                            | 12° 49' 56.9" N<br>77° 41' 26.0" E |
| A9         | Huskur                   | 3.2 km (S)                             | 12° 51' 41.2" N<br>77° 42' 15.4" E |

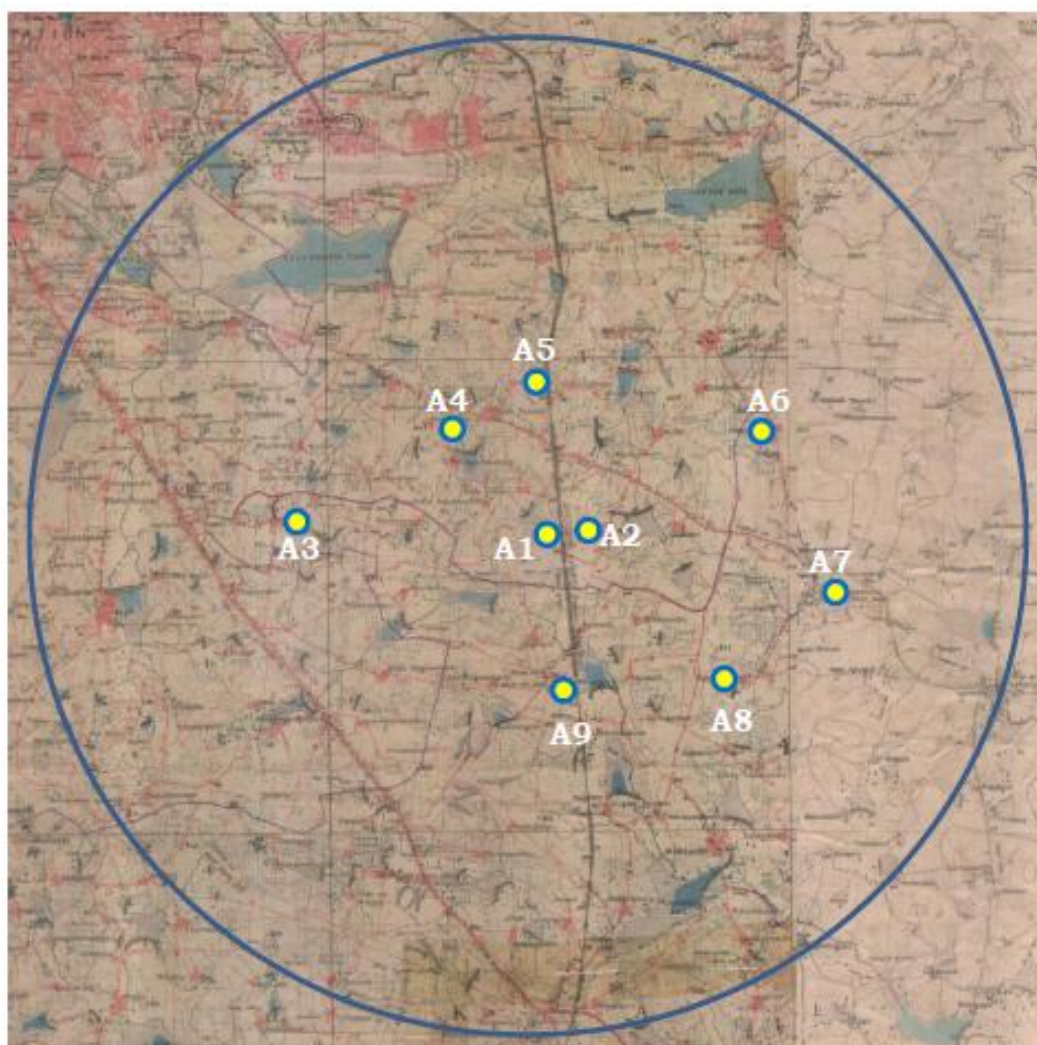


FIGURE-3.8: AIR SAMPLING LOCATIONS

TABLE-3.12: NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

| Pollutant                                             | Units | Time Weighted Average | Concentration in Ambient Air (µg/m³)           |                                                              |                                                                    |
|-------------------------------------------------------|-------|-----------------------|------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------------|
|                                                       |       |                       | Industrial, Residential , Rural And Other Area | Ecologically Sensitive Area (Notified by Central Government) | Methods of Measurement                                             |
| Sulphur dioxide (SO <sub>2</sub> )                    | µg/m³ | Annual*               | 50                                             | 20                                                           | - Improved West and Gaeke<br>- Ultraviolet fluorescence            |
|                                                       |       | 24 Hours**            | 80                                             | 80                                                           |                                                                    |
| Nitrogen dioxide (NO <sub>2</sub> )                   | µg/m³ | Annual*               | 40                                             | 30                                                           | - Modified Jacob & Hochheiser (Na-Arsenite)<br>- Chemiluminescence |
|                                                       |       | 24 Hours**            | 80                                             | 80                                                           |                                                                    |
| Particulate Matter (Size < 10 µm) or PM <sub>10</sub> | µg/m³ | Annual*               | 60                                             | 60                                                           | - Gravimetric<br>- TOEM<br>- Beta attenuation                      |
|                                                       |       | 24 Hours**            | 100                                            | 100                                                          |                                                                    |
| Particulate                                           | µg/m³ | Annual*               | 40                                             | 40                                                           | - Gravimetric                                                      |

|                                                 |                   |            |     |      |                                                                                                        |
|-------------------------------------------------|-------------------|------------|-----|------|--------------------------------------------------------------------------------------------------------|
| Matter (Size < 2.5µm) or PM <sub>2.5</sub>      |                   | 24 Hours** | 60  | 60   | - TOEM<br>- Beta attenuation                                                                           |
| Ozone (O <sub>3</sub> )                         | µg/m <sup>3</sup> | 8 Hours**  | 100 | 100  | - UV photometric<br>- Chemiluminescence<br>- Chemical Method                                           |
|                                                 |                   | 1 Hour**   | 180 | 180  |                                                                                                        |
| Lead (Pb)                                       | µg/m <sup>3</sup> | Annual*    | 0.5 | 0.50 | - AAS/ICP method after sampling on EPM 2000 or equivalent filter paper<br>- ED-XRF using Teflon filter |
|                                                 |                   | 24 Hours** | 1.0 | 1.0  |                                                                                                        |
| Carbon monoxide (CO)                            | mg/m <sup>3</sup> | 8 Hours**  | 02  | 02   | - Non Dispersive Infra Red (NDIR) spectroscopy                                                         |
|                                                 |                   | 1 Hour**   | 04  | 04   |                                                                                                        |
| Ammonia (NH <sub>3</sub> )                      | µg/m <sup>3</sup> | Annual*    | 100 | 100  | - Chemiluminescence<br>- Indophenol blue method                                                        |
|                                                 |                   | 24 Hours** | 400 | 400  |                                                                                                        |
| Benzene (C <sub>6</sub> H <sub>6</sub> )        | µg/m <sup>3</sup> | Annual*    | 05  | 05   | - Gas chromatography based continuous analyzer<br>- Adsorption and Desorption followed by GC analysis  |
| Benzo (a) Pyrene (BaP) - particulate phase only | ng/m <sup>3</sup> | Annual*    | 01  | 01   | - Solvent extraction followed by HPLC/GC analysis                                                      |
| Arsenic (As)                                    | ng/m <sup>3</sup> | Annual*    | 06  | 06   | - AAS/ICP method after sampling on EPM 2000 or equivalent filter paper                                 |
| Nickel (Ni)                                     | ng/m <sup>3</sup> | Annual*    | 20  | 20   | - AAS/ICP method after sampling on EPM 2000 or equivalent filter paper                                 |

**TABLE-3.13: AMBIENT AIR QUALITY PARAMETERS RESULTS**

| Details                                                      | A1   | A2   | A3   | A4   | A5   | A6   | A7   | A8   | A9   |
|--------------------------------------------------------------|------|------|------|------|------|------|------|------|------|
| PM <sub>10</sub> , µg/m <sup>3</sup>                         | 66.4 | 55.2 | 53.6 | 61.8 | 60.5 | 66.1 | 60.8 | 57.9 | 58.9 |
| PM <sub>2.5</sub> , µg/m <sup>3</sup>                        | 27.6 | 23.3 | 22.5 | 28.0 | 32.2 | 28.3 | 24.5 | 21.8 | 24.1 |
| NO <sub>x</sub> , µg/m <sup>3</sup>                          | 19.5 | 15.6 | 15.6 | 16.4 | 15.6 | 16.4 | 14.1 | 15.6 | 17.2 |
| SO <sub>2</sub> , µg/m <sup>3</sup>                          | 16.3 | 13.9 | 10.1 | 12.4 | 11.6 | 12.4 | 10.8 | 11.6 | 12.4 |
| Carbon Monoxide, as CO, mg/m <sup>3</sup>                    | 0.82 | 0.42 | 0.52 | 0.48 | 0.41 | 0.68 | 0.62 | 0.56 | 0.51 |
| Lead as Pb, µg/m <sup>3</sup>                                | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  |
| Ozone as O <sub>3</sub> , µg/m <sup>3</sup>                  | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  |
| Ammonia as NH <sub>3</sub> , in µg/m <sup>3</sup>            | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  |
| Benzene as C <sub>6</sub> H <sub>6</sub> , µg/m <sup>3</sup> | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  |
| Benzo (a) Pyrene as BaP, ng/m <sup>3</sup>                   | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  |
| Arsenic as As, ng/m <sup>3</sup>                             | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  |
| Nickel as Ni, ng/m <sup>3</sup>                              | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  | BDL  |

**Note:** All other parameters of Ozone, Lead (<0.05), Ammonium (<0.1), Benzene (<0.01), Benzo (a) Pyrene (BaP) (<0.01), Arsenic (<0.1), Nickel (<0.1) are below detectable level (BDL).

### **3.4 NOISE ENVIRONMENT**

#### **3.4.1 NOISE LEVEL SURVEY**

The source of most outdoor noise worldwide is mainly evolved from industries, constructions and transportation systems, including motor vehicle noise, aircraft noise and rail noise, poor urban planning may give rise to noise pollution.

The noise generated due to operation of individual process units at project site cause significant impacts on the surrounding environment including nearby human habitats. There are also some secondary noise sources associated with almost all types of large scale projects, which are mainly vehicles and DG set equipment at the project site. However, such sources could be categorized as intermittent/continuous noise sources depending on frequency/intensity.

A reconnaissance survey was conducted with a view to establish the baseline status of the environment with respect to the noise levels in the region particularly with respect to industrial activity in the region, sound pressure levels (SPL) were measured using precision sound level meter.

Survey was carried out in the following steps:

- Reconnaissance
- Measurement of background noise levels in the study area
- Identification and characterization of noise sources
- Measurement of prevailing noise levels due to vehicular movements

The impact of noise on the health of an individual depends on physical dose of noise viz. Noise level, frequency spectrum, annoyance etc and human factors viz sex, age health status, type of activity, occupational exposure etc. The impacts also depends on psychological and physiological status of individuals, the impact due to noise do not undergo seasonal variations except some directional changes depending upon the environmental wind direction.

The environmental impact assessment w.r.t noise for the proposed project was carried out by taking various factors into consideration like potential physiological

responses, annoyance and general community responses and also the existing status of noise levels within the study area. Existing noise levels have been monitored at different places within the study area. Ambient noise monitoring was carried out in residential, commercial, silence zones and roadside in the study area. Sound Pressure Level (SPL) measurements were undertaken at the project area & surrounding 10 km study area.

The prevailing ambient noise levels were monitored using precision noise level meter in and around 10Km distance in 8 locations during April to June 2017. The detailed of sampling locations are depicted in figure 3.9 and described in table 3.12.

**TABLE-3.14: NOISE QUALITY MONITORING LOCATIONS**

| <b>Sample No.</b> | <b>Name of Sampling station</b> | <b>Distance &amp; direction from project site</b> | <b>Co-ordinates</b>                |
|-------------------|---------------------------------|---------------------------------------------------|------------------------------------|
| N1                | Project Site                    | --                                                | 12° 53' 11.3" N<br>77° 42' 17.2" E |
| N2                | Kodathi                         | 1.3 km (E)                                        | 12° 53' 22.2" N<br>77° 42' 55.1" E |
| N3                | Kudlu                           | 5.6 km (W)                                        | 12° 53' 26.4" N<br>77° 30' 0.89" E |
| N4                | Junnasandra                     | 3.2 km (NW)                                       | 12° 53' 03.4" N<br>77° 40' 42.7" E |
| N5                | Kannalli                        | 3.0 km (N)                                        | 12° 54' 56.0" N<br>77° 42' 09.6" E |
| N6                | Heggondahalli                   | 5.5 km (NE)                                       | 12° 54' 25.7" N<br>77° 44' 57.2" E |
| N7                | Dommasandra                     | 5.3 km (SE)                                       | 12° 52' 48.3" N<br>77° 44' 45.6" E |
| N8                | Kammasandra                     | 4.9 km (SE)                                       | 12° 49' 56.9" N<br>77° 41' 26.0" E |
| N9                | Huskur                          | 3.2 km (S)                                        | 12° 51' 41.2" N<br>77° 42' 15.4" E |



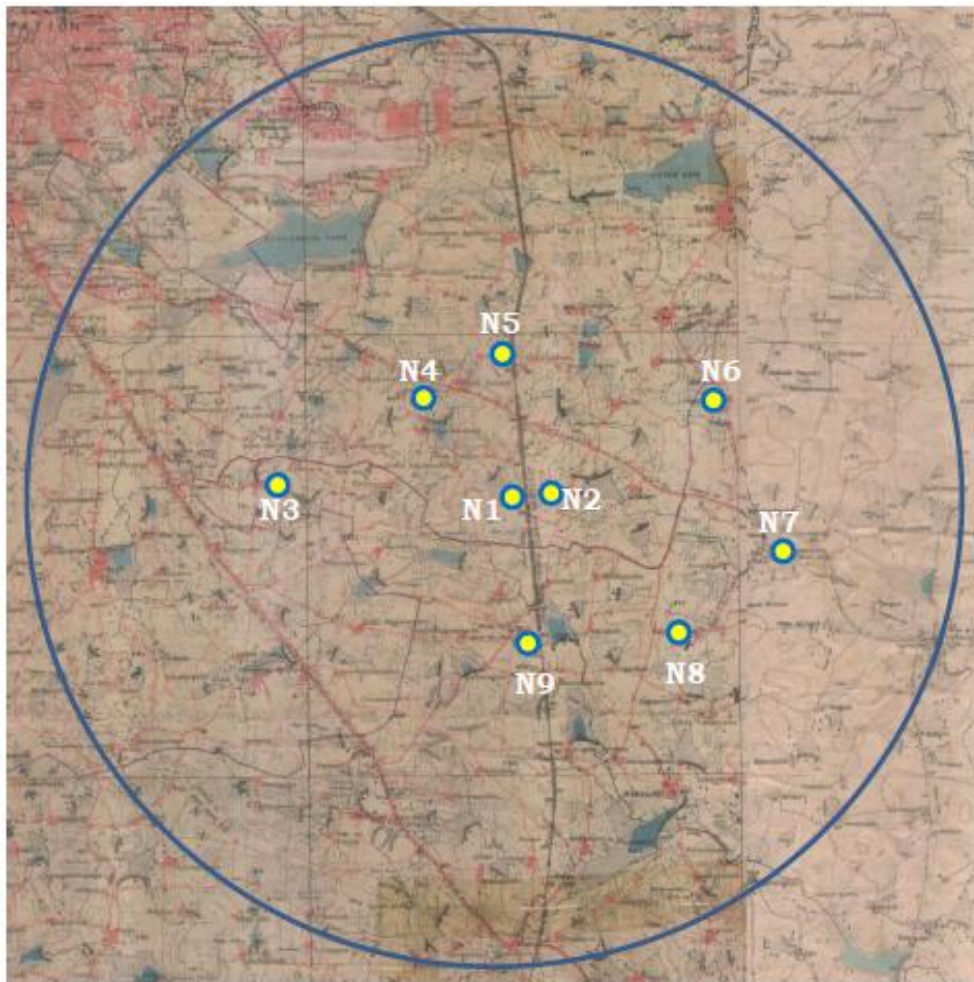


FIGURE-3.9: NOISE SAMPLING LOCATIONS

#### PARAMETERS CONSIDERED DURING MONITORING

For noise levels measured over a given period of time interval, it is possible to describe important features of noise using statistical quantities. This is calculated using the percent of the time certain noise levels are exceeded during the time interval. The notation for the statistical quantities of the noise levels are described below:

$L_{10}$  is noise level exceeded 10% of the time;

$L_{50}$  is noise level exceeded 50% of the time; and

$L_{90}$  is noise level exceeded 90% of the time.

The computed noise level parameters for the project site are presented in table - 3.14.

TABLE-3.15: AMBIENT NOISE STANDARDS

| Area Code | Category of Area | Noise Levels dB(A) $L_{eq}$ |            |
|-----------|------------------|-----------------------------|------------|
|           |                  | Day Time*                   | Night Time |
| A         | Industrial Area  | 75                          | 70         |
| B         | Commercial Area  | 65                          | 55         |
| C         | Residential Area | 55                          | 45         |
| D         | Silence Zone**   | 50                          | 40         |

Source: CPCB

TABLE-3.16: MEASURED AMBIENT NOISE LEVELS dB (A)

| Sampling station | Sound level dB (A) |      | Result dB (A) |
|------------------|--------------------|------|---------------|
|                  | Min                | Max  |               |
| Project Site     | 50.3               | 59.8 | 54.8          |
| Kodathi          | 41.3               | 65.0 | 51.8          |
| Kudlu            | 52.2               | 57.6 | 54.8          |
| Junnasandra      | 49.3               | 55.2 | 52.2          |
| Kannalli         | 45.3               | 46.7 | 45.9          |
| Heggondahalli    | 47.1               | 49.8 | 48.4          |
| Dommasandra      | 42.5               | 64.7 | 52.4          |
| Kammasandra      | 46.2               | 53.1 | 49.5          |
| Huskur           | 47.6               | 53.3 | 50.3          |

Analysis reports of Air, Water, Soil and Noise were enclosed as Annexure-11

### 3.5 BIOLOGICAL ENVIRONMENT

#### 3.5.1 INTRODUCTION

Study of biological environment is one of the most important aspects for Environmental Impact Assessment, in view of the need for conservation of environmental quality and biodiversity. Ecological systems show complex inter-relationships between biotic & abiotic components including dependence, competition and mutualism. Biotic components comprises of both plant and animal communities which interact not only within and between themselves but also with the abiotic components viz. Physical and Chemical components of the environment.

Generally, biological communities are the good indicator of climatic and edaphic factors. Studies on biological aspects of ecosystems are important in environmental impact assessment for safety of natural flora and fauna information on the impact of environmental stress on community structure serves as an inexpensive and efficient early warning system to check the damage to a particular ecosystem. The biological environment includes mainly terrestrial ecosystem and aquatic ecosystem.

### **3.5.2 OBJECTIVES AND METHODOLOGY**

The present study was undertaken with following objectives:

- To assess the distribution of animal life spectra;
- To assess the biodiversity and to understand the resource potential.
- To assess the nature and distribution of vegetation in and around the existing project site;

#### **Methodology of Data Collection:**

Following methods are being adopted for the ecological study:

- Generation of primary data through systematic ecological studies in the study area;
- Secondary data collected from publications of various Government agencies like Forest Department, Agriculture Department etc.; and
- Consulting local people for gathering information on ethnobotany, local plants and animals.

### **3.5.3 BASELINE ECOLOGICAL DATA: FORAL DETAILS**

The topographical and climatic features of the district are subjected to small regional variations and are, by and large, favorable for the growth of a variety of plants, shrubs and trees. Most of the area in Bengaluru urban district was under cultivation for centuries and now there has been felling of all woody plants for fuel resulting in the growth of scrub vegetation. Vast areas are covered by thickets of extensive growth of

lantana and other xenomorphic thorny shrubs rendering the area impenetrable and forming a most striking feature of the vegetation.

The vegetation in general regarded as deciduous jungle type with the exception of the valleys, and a majority of species inhabiting these areas exhibit xeromorphy. The Bannerghatta forests in Anekal Taluk represent the original flora typical to this region, which includes dry deciduous and thorny shrub trees. The natural vegetation of the region may be broadly grouped into seasonal vegetation, roadside and avenue trees which are planted and cultivated flora.

#### **SEASONAL VEGETATION:**

Seasonal vegetation is common in open waste lands and cultivated fields. This type of vegetation is active during the major part of the year and remains dormant only for a few months, starting from November or December and extending to May. After the first showers of monsoon in May, the ground, which is completely barren, becomes covered completely by green grass, and a few pioneer members such as *Cassia hirsute* (Kadu Uttarani), *Cassia kleinii*, *Cynodon dactylon* (garike hullu, perennial herb) etc...

As the monsoon advances, the ground vegetation becomes dominant and completely covered by many annual weeds, which continue to flower till date in November or December. This vegetation consists of *Ammannia baccifera* (kallarive, procumbent marsh herb), *Angallis arvensis* (suryakanti soppu, common weed), *Argemone mexicana* (datturada gida, prickly herb), *Corchorus aestuans* (hairy herb), *Crotalaria bifaria* (spreading hairy herb), *Fimbristylis ovata* (densely tufted shrub), *Imperata cylindrical* (sanna dabbe hullu, thatching grass), *Ocimum caccum* (aeromatic herb, nayitulasi), *Rotala fimbriata* (aquatic/semiaquatic herb), *Cyanotis axillaries* (negalakanne soppu, aquatic or marshy shrub), *Sphaeranthus indicus* (aromatic marsh herb) etc..

There are several small puddles on the plateau on top of Bannerghatta which are mostly inhabited by *Aponogeton natans* (aqueous tuberous herb). The tanks inside the study region possess a pure association of *Typha angustata* (anejondu, common water weed) and *Polygonum glabrum* (niruganigalu, stoloniferous herb).

The common roadside trees planted in the district are *Alstonia scholaris* (jantale, evergreen tree), *Artocarpus heterophyllus* (halasu), *Azadirachta indica* (bevu, evergreen), etc. *Parthenium*, a new pernicious weed, is a native of tropical South and North America and has moved gradually from one place to another by virtue of the light seeds blown by the wind. This weed is rampant in uncultivated areas and is observed to suppress the useful vegetation like grasses.

### 3.5.4 BASELINE ECOLOGICAL DATA: FAUNA DETAILS

Since the forest cover is quite scarce and most of the forest areas are small and are surrounded by agricultural lands, very few species of wild animals are found in the forests of the district. Occasionally, herds of elephants make an appearance in the forests and villages of Anekal Taluk from forests of neighbouring district. The larger game consisting mainly of cheetah or panther and the wild dog and animals such as the porcupine, jackal, wild cat etc. are mostly confined to the forests of Anekal Taluk. Domestic animals consists principally of horses, cows, bullocks, buffaloes, sheep, goat, asses, pigs, dogs and cats. The avifauna in the region is rich and varied. The birds which are regularly seen in the district are as listed in the below table 3.15.

TABLE-3.17: LIST OF AVIFAUNA SIGHTED IN THE REGION

| Sl. No. | Common Name         | Botanical Name                |
|---------|---------------------|-------------------------------|
| 1.      | Whiteheaded Babbler | <i>Turdoides affinis</i>      |
| 2.      | Redvented Bulbul    | <i>Pyconotus cafer</i>        |
| 3.      | Domestic Crow       | <i>Corvus Splendens</i>       |
| 4.      | Spotted Dove        | <i>Streptopelia chinensis</i> |
| 5.      | Pond Heron          | <i>Ardeola grayii</i>         |
| 6.      | Pied Kingfisher     | <i>Ceryle rudis</i>           |
| 7.      | Koel                | <i>Eudynamys scolopacea</i>   |
| 8.      | Myna, Greyheaded    | <i>Sturnus malabaricus</i>    |
| 9.      | Myna, Jungle        | <i>Acridotheres fuscus</i>    |
| 10.     | Owl, barn           | <i>Tyto alba</i>              |
| 11.     | Pigeon, blue rock   | <i>Columbia livia</i>         |
| 12.     | Indian Robin        | <i>Saxicoloides fulicata</i>  |
| 13.     | Flycatcher, brown   | <i>Muscicapa latirostris</i>  |
| 14.     | Asiatic sparrow     | <i>Accipiter nisus</i>        |
| 15.     | Grey wagtail        | <i>Motacilla cinerea</i>      |

|     |                     |                                 |
|-----|---------------------|---------------------------------|
| 16. | Large Indian Cuckoo | <i>Coracina novaehollandiae</i> |
| 17. | Painted Snipe       | <i>Rostratula benghalensis</i>  |
| 18. | Whitebacked vulture | <i>Gyps benghalensis</i>        |
| 19. | Indian Weaverbird   | <i>Ploceus philippines</i>      |

### 3.6 SOCIO-ECONOMIC ENVIRONMENT

Major developmental activities in residential sector are to meet the basic as well as luxurious requirements of civilized modern society, economical development, creation of employment opportunities (direct as well as indirect), which ultimately results in improvement of quality of life through upliftment of social, economical, health, education, infrastructure etc. status in the project region. Almost all residential developments are also expected to generate/discharge different forms of pollutants in the surrounding environment. This may cause natural resource degradation, ecological and human health risks, unless the development is planned and implemented in a sustainable manner through implementation of pollution prevention and control measures. In this manner all developmental projects have direct as well as indirect relationship with socioeconomic aspects. Thus the study of socio-economic component incorporating various facets related to social & cultural conditions and economic status in the project region is an important part of EIA study. The study includes demographic structure, population dynamics, infrastructure resources, status of human health and economic attributes like employment, per-capita income, agriculture, trade and industrial development etc. The aesthetic environment refers to the scenic value of the area, tourist attraction, forest and wildlife, historic and cultural monuments. The studies of these parameters help in identifying, predicting and evaluating the likely impacts on socioeconomic aspects due to proposed project developments.

The Methodology adopted for the study mainly includes review of published secondary data of the study area of 5km radial distance from the periphery of the proposed project site, which comes under Bengaluru East Taluk of Bengaluru in Karnataka state.

The study of socio-economic component of environment incorporating various facets related to socio-economic conditions in the area forms an integral part of EIA



process. The study includes demographic structure, population dynamics, infrastructure, resources and economic attributes refers to employment, industrial development and financial sustainability of the project. The aesthetic environment refers to scenic value of the area, tourist attraction, forest and wild life, historic and cultural monuments.

#### **RECONNAISSANCE:**

The proposed developmental projects will be commissioned within the residential zone. The study area covering 5km radial distances around the project site fall under Bengaluru East Taluk. Major part of study area is covered with highly undulated/hilly terrain mostly covered with natural vegetation as well as agro forestry especially in lower parts of hill slopes. In the study area, this is covered with number of small/medium scale industries. The infrastructure facilities including road network consisting Sarjapur Main road, Bengaluru Airport and Bengaluru Railway (network) are well developed in project region. Keeping in view the existing residential/commercial activities, this belt has been merged into urban agglomeration of Bengaluru city in 2011 census. The study area falls under Bengaluru East Taluk limits. Besides the study area covers both urban settlements and rural region.

M/s. APG Intelli Homes Private Limited is going for an Expansion of Residential Apartment by name “*Assetz Lifestyle - 63° East*” also Row houses, coming up on a land measuring about 1,06,786.42 Sqmt (26.38 Acres) at Survey No’s. 69/1, 69/2, 69/3, 69/4 & 171 of Kodathi Village, Varthur Hobli, Bengaluru East Taluk, Bengaluru District, Karnataka. The proposed project provides a luxurious residential apartment with modern amenities and comfortable living for the occupant. The site is notified as Residential zone is not inhabited hence rehabilitation and resettlement of people in the region due to the proposed project is not envisaged.

#### **BASELINE STATUS:**

The latest available data has been complied to delineate the baseline socio-economic profile in study area. The data base thus compiled from secondary sources of

various official records, viz. Census records, District statistical abstract, Primary Health Centres etc. and primary data collection through field survey as well as the observations by survey team study period include:

- Demographic structure
- Infrastructure base road network, communication, electricity,
- Education
- Health Status
- Economic attributes
- Socio economic status with reference to quality of life
- Awareness and opinion of people about the proposed project

The sample villages identified for socioeconomic survey in study area are shown in while they are listed in subsequent sections.

#### **DEMOGRAPHIC STRUCTURE:**

An official Census 2011 detail of Bengaluru, a district of Karnataka has been released by Directorate of Census Operations in Karnataka. Enumeration of key persons was also done by census officials in Bengaluru District of Karnataka.

In 2011, Bengaluru had population of 9588910 of which male and female were 5025498 (52.4%) and 4563412 (47.6%) respectively.

The district is rural in character-- 77 per cent of the population lives in rural areas. The total population of the district is 15.02 lakh (2.84 per cent of state's population). The rural population is highest in Aurad taluk (93.55 per cent). The density of population is 276 and the sex ratio is 949, which is below the state average of 964.

The demographical pattern in the study region shows that the percentage of males and females is nearly 52.4% and 47.6% respectively. The literacy rate in the study area is as high as 88.48%.

Demographical pattern comprising the details of literacy, child & adult population are delineated in the table.3.16.

TABLE-3.18: DEMOGRAPHICAL PATTERN

| State/<br>District/<br>Taluk<br>code | State/District/<br>Taluk | T/R/U | Population |         |         | 0-6 Population |        |         | Literates |         |         |
|--------------------------------------|--------------------------|-------|------------|---------|---------|----------------|--------|---------|-----------|---------|---------|
|                                      |                          |       | Persons    | Males   | Females | Persons        | Males  | Females | Persons   | Males   | Females |
| 18                                   | Bengaluru                | Total | 9588910    | 5025498 | 4563412 | 988482         | 509268 | 479214  | 7609962   | 4146709 | 3463253 |
| 18                                   | Bengaluru                | Rural | 868971     | 464122  | 404849  | 94272          | 48287  | 45985   | 608655    | 352228  | 256427  |
| 18                                   | Bengaluru                | Urban | 8719939    | 4561376 | 4158563 | 894210         | 460981 | 433229  | 7001307   | 3794481 | 3206826 |
| 001                                  | Bengaluru North          | Total | 302754     | 158669  | 144085  | 32849          | 16931  | 15918   | 216839    | 123396  | 93443   |
| 001                                  | Bengaluru North          | Rural | 269266     | 141172  | 128094  | 29145          | 15052  | 14093   | 191217    | 109124  | 82093   |
| 001                                  | Bengaluru North          | Urban | 33488      | 17497   | 15991   | 3704           | 1879   | 1825    | 25622     | 14272   | 11350   |
| 002                                  | Bengaluru South          | Total | 185594     | 98699   | 86895   | 20255          | 10446  | 9809    | 129090    | 74258   | 54832   |
| 002                                  | Bengaluru South          | Rural | 154750     | 81466   | 73284   | 17084          | 8812   | 8272    | 104771    | 59807   | 44964   |
| 002                                  | Bengaluru South          | Urban | 30844      | 17233   | 13611   | 3171           | 1634   | 1537    | 24319     | 14451   | 9868    |
| 003                                  | Bengaluru East           | Total | 94584      | 44892   | 44892   | 11161          | 5691   | 5470    | 67530     | 38403   | 29127   |
| 003                                  | Bengaluru East           | Rural | 94584      | 44892   | 4489    | 11161          | 5691   | 5470    | 67530     | 38403   | 29127   |
| 003                                  | Bengaluru East           | Urban | 0          | 0       | 0       | 0              | 0      | 0       | 0         | 0       | 0       |
| 004                                  | Anekal                   | Total | 506579     | 277190  | 229389  | 53474          | 27235  | 26239   | 364431    | 213472  | 150959  |
| 004                                  | Anekal                   | Rural | 350371     | 191792  | 158579  | 36882          | 18732  | 18150   | 245137    | 144894  | 100243  |
| 004                                  | Anekal                   | Urban | 156208     | 85398   | 70810   | 16592          | 8503   | 8089    | 119294    | 68578   | 50716   |

As far as the economic status in the study area is concerned, economy is mainly based on agriculture, plantation and forestry.

**INDUSTRIAL SCENARIO:**

Bengaluru district is industrially the most advanced city in Karnataka. The city is endowed with almost all primary requirements such as accessibility to raw materials, machinery, power, technicians, labourers, transport and communication, climatic conditions, marketing opportunities and financial facilities for the growth and development of industries.

Of the old time industries of the district, production of textile goods is the most notable. Several large and medium industries in the mechanized sector came up after the 1980's in the district. These include the major public sector industries such as Government press, Bengaluru Mill, Bengaluru Printing and Publishing Company Ltd., Government Soap Factory, Hindustan Aircraft Ltd. etc.

The post independence era in Bengaluru saw a flourishing industrial growth owing to the availability of power for industrial consumption, comparatively cheap labour and transport facilities. The industrial policy resolution enunciated by the Government of India in 1948 further accelerated the phase of industrial expansion. To name a few: Motor Industries Company, Hindustan Machine Tools Ltd., The New Government Electric Factory, Wheel and Axle Plant, BHEL, BEML, BEL etc..

An interesting development in electronic field is the concept of an “Electronic City”, at Konnapana Agrahara, about 18 km from Bengaluru on Hosur road, as a specialized industrial estate for large, medium and small scale electronic units. The Karnataka State Electronics Development Corporation Ltd. (KEONICS) was incorporated in 1976 in Bengaluru, as a company with a view to plan, organize and promote electronic industries in Karnataka. With such an early initiative in the prospective field of electronics, Bengaluru has never looked back since then and is aptly named as Silicon Valley of India. The drastic boom in the Information Technology sector has transformed Bengaluru into a world class city in terms of economy and technical expertise. Garment manufacturing and Call center units are also doing well in the off-late years.

The city mainly houses the IT industries, most of which are situated along Hosur Road and Electronics City. Some Garment units and other SSI (Small Scale Industries) are also present in the industrial suburbs such as Begur, Veerasandra, Bommanahalli, Naganathapura etc.

**BANKING, TRADE & COMMERCE:**

Productive activities are mostly represented by agriculture and industry. Organized and unorganized banking and other credit agencies including the government agencies help production by assisting capital formation and its channelization for various productive activities. At the same time, commerce in general removes the hindrances of place, person and time.

Being an industrially hyperactive region, the financial needs of the area is sufficiently served by the vibrant Banking institutes. Besides almost all of the nationalized banks and local co-operative banks, numerous multinational banks have also been rendering services over the region.

**TRANSPORT SECTOR:**

Being the capital city of the state, Bengaluru is well connected by Road, Rail & Air, with the other major cities in India. Totally 143 km of National Highways run through Bengaluru district originating from Bengaluru city connecting the cities like Chennai, Hyderabad, Mumbai and Mangalore. The length of the state highway amounts to 194 km. Total length of surfaced roads by considering district as a whole sums up to 718 km.

The railway lines in five different directions terminate at Bengaluru city station viz.:

- (a) Miraj Line in North Western Direction
- (b) Guntakal Line towards North
- (c) Salem Line passing from North West to South West
- (d) Chennai Line towards East
- (e) Mysore Line towards South East

There are direct trains running from Bengaluru city towards the other major metropolis – Delhi, Chennai, Calcutta & Mumbai. The total length of railway lines in the district as a whole is about 130 km with nearly 30 stations.

Bengaluru airport was built by Hindustan Aeronautics Ltd. for its use and the same is being used for Civil Aviation as civil airport. The airport comprise of both domestic and international terminals with daily flights to the major cities in India and around the world. Number of flights operating from Bengaluru is increasing owing to the proportionate demand from the well flourishing industrial sectors. Now the airline services have been being fulfilled by Kempe Gowda International Airport.

#### **EDUCATION:**

The study region is also known for its quality education and world's best institutions like IISc, IIM, IIIT etc. Apart from adequate schools & colleges providing basic education to the needy, there are also numerous professional institutions and other institutions offering specialized courses relevant to the present day job market.

#### **PLACES OF TOURIST INTEREST:**

Though the Bengaluru city dominates the scene in this small district, the mofussil areas too do not lag behind in their charm and importance from the point of their antiquity and their historical monuments, places of scenic beauty and religious sanctity.

Bengaluru with its modern buildings, parks, industries, temples dominates the scene. To name a few of the monuments of worth visiting – Vidhana Soudha, High Court Building, Bengaluru Palace etc. The city lives upto its fame as the 'Garden City' with its beautifully maintained parks and gardens.

### **3.7 SOLID WASTE**

As per the Municipal solid waste Management rules 2000, BBMP is responsible for taking the waste management as per the situation.

- \* Door to Door collection of Municipal solid waste (MSW)
- \* Sweeping & drain cleaning twice daily of Main roads



- \* Collection of MSW from designated location and transportation to the transit segregation point or landfill site

### **3.7.1 SOLID AND HAZARDOUS WASTE GENERATED DURING CONSTRUCTION PHASE**

- \* Quantity of solid waste generated from labors during construction stage is very less and same will be handed over to BBMP.
- \* Excavated earth material generated during construction phase is 47,247.38 cum and will be reused within the site for backfilling, landscaping.
- \* Total quantity of construction debris of 300 cum will be generated during construction phase and it will be used within the site for formation of roads & pavements.

### **3.7.2 SOLID AND HAZARDOUS WASTE GENERATED DURING OPERATION PHASE**

- \* Total quantum of solid waste generated from the proposed project will be 4.2MT/day. Out of which, organic waste contributes to 50% i.e, 2.1MT/day and In-organic waste contributes to 50% i.e, 2.1MT/day
- \* Organic wastes will be segregated & collected at household levels and will be processed in organic waste converter.
- \* The recyclable portion like paper, plastics, glass, metals etc. will be given to the waste collectors for recycling.
- \* Organic sludge from STP of about 65kg/day will be generated and same will be used as manure for gardening within the site.
- \* Waste oil generated from the DG sets will be collected in leak proof barrels and handed over to the authorized waste oil recyclers/processors.
- \* Household hazardous wastes (expired cosmetics, batteries, cleaning agents, paints, mosquito/cockroach spray containers, and insecticides) will be collected and handed over to the authorized processors.

- \* Generated E-Wastes will be collected separately & handed over to the authorized & approved by KSPCB E-waste processors.

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**CHAPTER - 4**

**ANTICIPATED ENVIRONMENTAL IMPACTS  
AND MITIGATION MEASURES**

**4.1 INTRODUCTION**

Environmental impact is the term applied to the systematic examination of the likely impacts due to the proposed residential development of "*Assetz Lifestyle 63° East*" project on the surrounding environment due to different project activities during construction and operation phase of the project.

This chapter deals with the Environmental Impacts due to project location, possible accidents, project design, project construction, regular operations, final decommissioning or rehabilitation of a completed project. The environmental impacts may be direct, indirect and cumulative impacts.

Environmental Impact study describes identification and appraisal of various impacts due to the proposed residential project. Environmental Impact can be defined as any alteration of environmental conditions or creation of a new set of environmental conditions, adverse or beneficial, caused or induced by the action or set of actions under consideration. Environmental impact assessment is one of the tools available with the planners to understand the impacts that would emanate from the proposed project.

The impacts on environment have been predicted for the proposed project assuming that the pollution due to the existing activities have already been covered under baseline environmental monitoring. Impact prediction is a way of 'mapping' the environmental consequences of the significant aspects of the project and its alternatives. Environmental impact can never be predicted with absolute certainty and this is all the more reason to consider all possible factors and take all possible precautions for reducing the degree of uncertainty.

The objective of study of Environmental Impacts is to foresee and address the potential environmental problems at an early stage of planning and design of the project. This study covers up to 10 km radius around the project location.

Generally, the environmental impacts can be categorized as either primary or secondary. Primary impacts are those which are attributed directly by the project wherein secondary impacts are those which are indirectly induced and typically include the associated investment and changed patterns of social and economic activities by the proposed action. Some of these impacts would have long term and short term intuition on the surrounding environment.

## 4.2 IMPACT IDENTIFICATION MATRIX

From the table-4.1 significant environmental impacts are identified. They are further elaborated with characterization and assessment. Table-4.2 and Table-4.3 provide the characteristics of impacts from construction and operational activities of the project respectively.

**TABLE-4.1: IMPACT IDENTIFICATION MATRIX**

| Activities                      | Environmental attributes |       |               |              |             |         |                 |            |
|---------------------------------|--------------------------|-------|---------------|--------------|-------------|---------|-----------------|------------|
|                                 | Air                      | Noise | Surface water | Ground water | Land & Soil | Ecology | Socio-Economics | Aesthetics |
| Site Clearing                   | 0                        | 0     | 0             | 0            | 0           | 0       | 0               | 1          |
| Transportation of Raw materials | -1                       | -1    | 0             | 0            | 0           | 0       | 1               | 0          |
| Construction Activities on land | -1                       | -1    | 0             | 0            | -2          | 0       | 1               | -1         |
| Laying of Roads                 | -1                       | -1    | 0             | 0            | -1          | 0       | 1               | -1         |
| Labor camps                     | 0                        | 0     | 0             | 0            | 0           | 0       | 0               | 0          |
| Operation of DGs                | -1                       | -1    | 0             | 0            | 0           | 0       | 0               | 0          |
| Solid waste disposal            | -1                       | 0     | -1            | -1           | -1          | 0       | -1              | -1         |
| Wastewater disposal             | -1                       | 0     | -1            | -1           | -1          | 0       | -1              | -1         |
| Buildings and Landscape         | 0                        | 0     | 0             | 1            | 1           | 1       | 0               | 1          |
| Transportation                  | -1                       | -1    | 0             | 0            | 0           | 0       | 1               | 0          |
| Recreation Activities           | 0                        | 0     | 0             | 0            | 0           | 0       | 1               | 0          |

### Grading of Impacts:

2-Most Positive, 1-Positive, 0-No Impact, -1 -Negative, -2-Most Negative

**TABLE-4.2: ENVIRONMENTAL IMPACTS DUE TO CONSTRUCTION ACTIVITIES**

| Activity      | Environmental Attributes | Cause                                    |
|---------------|--------------------------|------------------------------------------|
| Site clearing | Air quality              | Dislodging of particles from the ground. |

|                                           |                                                          |                                                                                              |
|-------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------------------------------------|
|                                           | (SPM and RPM)                                            |                                                                                              |
|                                           | Noise levels                                             | Noise generation arises usually from earth excavating equipment and transportation vehicles. |
|                                           | Land & Soil                                              | Removal of vegetation cover and reduced soil stability.                                      |
|                                           | Aesthetics                                               | Removal of weeds.                                                                            |
| Transportation of Construction materials  | Air quality (PM, SO <sub>2</sub> , NO <sub>x</sub> , CO) | Transport of construction material in trucks; exhaust emission from vehicles.                |
|                                           | Noise levels                                             | Noise generation from vehicles.                                                              |
|                                           | Risk                                                     | Risk of accidents during transport, loading and unloading.                                   |
| Construction activities / Laying of roads | Air quality (PM, SO <sub>2</sub> , NO <sub>x</sub> , CO) | Operation of construction machinery, welding activities and others.                          |
|                                           | Noise levels                                             | Noise generation from use of machinery.                                                      |
|                                           | Land & Soil                                              | Reduced Soil Stability.                                                                      |
|                                           | Aesthetics                                               | All Construction activities.                                                                 |
| Construction Labours                      | Water quality (BOD, TSS, Fecal Coli form)                | Discharge of untreated sewage.                                                               |
|                                           | Land and Soil                                            | Generation of solid wastes from construction activity.                                       |
|                                           | Socio-economics                                          | Employment opportunities to local people & skilled & semi skilled labours.                   |

**TABLE-4.3: ENVIRONMENTAL IMPACTS DURING OPERATION PHASE**

| Activity                                   | Environmental Attributes                                     | Cause                                                                        |
|--------------------------------------------|--------------------------------------------------------------|------------------------------------------------------------------------------|
| Afforestation/<br>Landscaping              | Ground Water                                                 | Ground Water Recharge.                                                       |
|                                            | Land & Soil                                                  | Abatement of Erosion.                                                        |
|                                            | Ecology                                                      | Afforestation.                                                               |
|                                            | Aesthetics                                                   | Scenic views.                                                                |
| Vehicular traffic for conveyance of people | Air quality (SPM SO <sub>2</sub> , NO <sub>x</sub> , CO, HC) | Vehicle operation and fuel combustion.                                       |
|                                            | Noise levels                                                 | Noise generation from vehicles.                                              |
|                                            | Socio-Economic                                               | Employment for local transport services.                                     |
| Solid-Waste Disposal                       | Air Quality                                                  | Odour Nuisance.                                                              |
|                                            | Water Quality                                                | Surface runoff contamination and ground water contamination due to leachate. |
|                                            | Land & Soil                                                  | Soil contamination due to leachate.                                          |
|                                            | Socio Economics                                              | Objections from the local community.                                         |
|                                            | Aesthetics                                                   | Scenic blights.                                                              |
| Wastewater discharge                       | Water quality                                                | Contamination of water resources due to untreated wastewater.                |

|                   |              |                    |
|-------------------|--------------|--------------------|
| DG set, operation | Air quality  | Exhaust emissions. |
|                   | Noise levels | Noise generation.  |

The impacts on each environmental component due to the proposed project activities are separately identified and suitable mitigation measures are recommended for the same. The likely to be affected six basic environmental components due to the above project activities are as follows.

1. Air Environment
2. Water Environment
3. Noise Environment
4. Land Environment
5. Socio-economic Environment
6. Ecology

The Environmental impacts on above environmental parameters due to the proposed project activities are discussed in detail in the following sections. The potential significant impacts due to proposed project activities on each environmental component are studied under mainly two phases, i.e. during

- Construction phase
- Operation phase.

#### 4.3 ANTICIPATED IMPACT AND MITIGATION MEASURES DURING CONSTRUCTION PHASE

The impacts poses during construction phase will be temporary and restricted to small area for short duration. Depending upon the availability of the site details and impact characterization for the construction phase, it is identified that the construction phase impacts were low, short term and reversible. The impact on the environment arising during the construction phase are discussed in detail in the below sections.

##### 4.3.1 IMPACT ON AIR ENVIRONMENT

The impact causing project activities on Air Environment during construction phase are leveling of site, demolition work if any, construction and erection of buildings



etc., and associated equipments in operation. Apart from this, activities also include dismantling of unwanted existing structures, site clearance, storage and haulage of construction materials and disposal of surplus earth, debris and refuse.

Air pollution due to the proposed project activities will mainly include gaseous pollution (SO<sub>2</sub>, NO<sub>x</sub> and CO) and suspended particulate matter. The sources of air emissions during construction phase will include site clearing, emission from vehicles used for transportation of man and material to the site, emission from DG sets and from construction equipment. These emissions are expected to have temporary adverse impact on ambient air quality of surroundings of the construction site only on construction phase. Traffic at the site during construction will be more intensive and much heavier than normal operating conditions. In turn, it will subject roads to more stress. The prevailing soil surface particles within the proposed area shall have a tendency to become airborne by vehicular tyres once the area is disturbed by construction activities. This dust will lead to an increase in the background SPM concentration of the area. The building material carrying vehicles as well as the construction machinery generate emissions and pollute the environment. Dusts include brick and silica dusts, wood dust from joinery and other wood working and from earth moving and other vehicular movements within the site. Construction machinery poses a special threat to air quality. It is estimated that construction machinery emits toxic pollutants and are sources of fine particulate matter (PM<sub>2.5</sub>) which lodges deeply in the human lung. Detail baseline study has been conducted for the air environment parameters and the same are recorded in the **Chapter - 3**.

**Mitigation Measures:** To mitigate these impacts, regular sprinkling of water will be done at the construction site. Approach roads will be black carpeted/asphalted and this will help to reduce the fugitive emissions. The vehicles, which are involved in construction activity, will be kept in good condition to minimize automobile exhaust.

#### **4.3.2 IMPACT ON LAND ENVIRONMENT**

##### **4.3.2.1 SOIL SUBSTRATA**

The removal of soil cover will disturb the soil stability and texture. During construction, care will be taken to retain the present soil cover to the extent possible by proper construction management/planning. The stability of the soil will be re-established by proper preparation and better landscaping techniques. The substrata of this area are not rocky and as such no blasting is envisaged for either leveling or during foundation work.

**Mitigation Measures:** To conserve the soil substrata; soil disturbing activities will be restricted and will be minimum, preliminary landscape development will be done before construction and at the time of construction also. Top soil will be stored and reused for landscape development.

TABLE-4.4: EXCAVATED EARTH AND MANAGEMENT DETAILS

| Sl. No. | Particulars                                                       | Quantity in m <sup>3</sup> |                  |
|---------|-------------------------------------------------------------------|----------------------------|------------------|
|         |                                                                   | Excavation                 | Filling          |
| 1       | Tower A                                                           | --                         | 608.52           |
| 2       | Park area (B/W Tower A & Tower B)                                 | --                         | 3,545.46         |
| 3       | Tower B                                                           | 1,387.67                   | 4,972.5          |
| 4       | Park area (B/W Tower B & Tower C)                                 | --                         | 886.64           |
| 5       | Tower C                                                           | 8,209.43                   | 417.41           |
| 6       | Park area (B/W Tower C & Tower D)                                 | --                         | 5,694.62         |
| 7       | Tower D                                                           | 1,517.40                   | 9,600.90         |
| 8       | UG sump & STP                                                     | 2,464.80                   | --               |
| 9       | Tower E                                                           | 24,694.6                   | 794.38           |
| 10      | UG sump & STP                                                     | 2,148.80                   | --               |
| 11      | Tower F                                                           | 4,363.51                   | --               |
| 12      | Tower F fire driveway                                             | --                         | 2,280.10         |
| 13      | Peripheral filling and excavation apart from tower and park areas | 2,461.13                   | 21,253.54        |
| 14      | Row housing area filling                                          | --                         | 4,202.42         |
|         | <b>Total excavated earth</b>                                      | <b>47,247.38</b>           | <b>54,256.44</b> |

#### 4.3.2.2 CONSTRUCTION WASTES

Construction wastes are the waste materials generated by the construction refurbishment of buildings and other structures. It mainly consists of earth, stones, concrete, bricks, lumber, roofing materials, plumbing materials, heating systems and electrical wires and parts of the general municipal waste stream.

**Characteristics of Construction Wastes:**

This category of waste is complex due to the different types of building materials being used but in general may comprise the following materials:

**Major Components:**

- Cement concrete
- Bricks
- Cement plaster
- Steel (RCC, door/ window frames, roofing support, railings of staircase etc.)
- Rubble
- Stone (marble, granite, sand stone)
- Timber/ wood (especially demolition of old buildings)

**Minor Components:**

- Conduits (iron, plastic)
- Pipes (GI, iron plastic,)
- Electrical fixtures (copper/ Aluminum wiring, wooden baton, Bakelite/ plastic switches, wire insulation)
- Panels (Wooden, laminated)
- Other (glazed tiles, glass panes)

**Storage of Construction Waste:**

These wastes are best stored at source, i.e., at the point of generation. All attempts will be made to stick to the following measures.

- All construction wastes will be stored within the site itself. A proper screen will be provided wherever necessary so that the waste does not get scattered and does not become an eyesore.
- Attempts will be made to keep the waste segregated into different heaps as far as possible so that their further gradation and reuse is facilitated.
- Material, which can be reused at the same site for the purpose of construction, leveling, making road/ pavement etc. shall also be kept in separate heaps from those, which will be sold or land filled.

**Recycling and Reuse:**

The use of these materials basically depends on their separation and condition of the separated material. A majority of these materials are durable and therefore, have a high potential of reuse. It would however, be desirable to have quality standards for the recycled materials. Construction waste can be used in the following manner:

Reuse (at site) of bricks, stone slabs, timber, conduits, piping railings etc. to the extent possible and depending upon their condition:

- Concrete and masonry waste can be recycled by sorting, crushing and sieving into recycled aggregate. This recycled aggregate can be used to make concrete for road construction and building material.
- Sale/auction of materials, which cannot be used at the site due to design constraint or change in design.
- Plastics, broken glass, scrap metal etc. can be used by recycling industries.
- Rubble, brick bats, broken plaster concrete pieces etc. can be used for building activity, such as, leveling under coat of lanes where the traffic does not constitute of heavy moving loads.

**Disposal:** Being predominantly inert in nature, construction waste does not create chemical or biochemical pollution. Hence maximum effort should be made to reuse and recycle them as indicated above and same will act as mitigation measure.

**4.3.2.3 LAND USE**

The construction of proposed residential apartment would bring in certain immediate changes in the land use pattern of the area as well as in the vicinity. The construction activities would attract a sizable labour population and the influx of population (skilled and semiskilled labours) is likely to be associated within the site premises. This however, would be temporary, especially during construction phase.

**4.3.2.4 NATURAL DRAINAGE SYSTEM**

As per the site scenario project site slopes towards North direction with a higher contour level of 99.5m in South and lower contour level of 88.5m in the North direction

of the site as indicated in the contour plan and there is an existing storm water drain, which carries the upstream runoff and will not allow entering in to the site. Hence due to this proposed development there won't be any obstruction to natural drainage system.

#### **4.3.3 IMPACT ON WATER ENVIRONMENT**

The average water requirement for the construction work is estimated to be about 25 KLD for the duration construction period. This water is mainly drawn from other project as STP treated water through tanker and the copy is attached as **Annexure-12**, hence there won't be any surface and ground water trapping for construction water requirement & there won't be any wastewater generation due to the construction activity.

The domestic water requirement during construction phase is estimated to be about 9 KLD and the source of water for this purpose is external tanker water supplier. The sewage generated from the labours is estimated to be about 7.2 KLD and the same will be collected in a collection tank and will be treated in septic tank with soak pit.

Wastewater generation due to construction activity is nil and generated domestic wastewater from construction labours will be managed properly, hence there won't be any adverse impact on ground and surface water during construction.

#### **4.3.4 IMPACT ON NOISE ENVIRONMENT**

The sources of noise during construction phase are as follows:

- Construction equipments
- Vehicular movements
- DG Sets for power back up

The major source of noise during construction phase are due to vehicular traffic and the operation of construction equipments like Dozers, Scrapers, Concrete Mixers, Pneumatic Tools, Vibrators, etc. The operation of these equipments will generate noise ranging from 85 to 95 dB (A) near source. The noise produced during the construction will have significant impact on the ambient noise levels. The construction equipment may have high noise levels, which can affect the personnel who are operating the

machines. These noises will be generated within the existing site boundary and will be transient in nature.

#### **Mitigation Measures**

- Provision of insulating caps and enclosures at the exit of noise sources on the machinery
- Construction equipment generating minimum noise and vibration were chosen
- Internal speed limit for vehicles carrying construction materials are maintained with 15 kmph
- Trained security men deployed for guiding smooth entry/exit without traffic congestion which will help in reducing honking conditions
- Ear plugs provided to the workers exposed to high noise prone activities and it was enforced to be used by the workers
- DG sets with acoustic enclosures complying to Environment (protection) Rules provided
- 2 stage barricades are provided all long the site boundary to avoid noise nuisance on the surrounding population
- Use of proper personal protective equipment will mitigate any significant impact of the noise generated by such equipment.
- Also, the utility of the noisy equipments will be restricted only during the day time; hence the impact on the neighborhood due to the activity will be negligible.

#### **4.3.5 IMPACT ON ECOLOGY**

There is no interference of the project on Terrestrial Ecology. The initial construction works at the project site involves no significant land clearance, cutting of trees, filling and leveling. So the construction activity will not result in any major loss of vegetation. And also the site is an unused land therefore there won't be any loss/effect on potential agricultural productive land.

The species identified within the terrestrial study area are not endangered, rare or protected; in addition, they will not be affected by the project. The increased construction vehicular traffic coupled with higher noise level due to various



construction activities will drive away the fauna from the project site to the neighboring area. Therefore the impact of construction activities on terrestrial ecology will be negligible and mean while the project site will be extensively landscaped with the development of green belt consisting of variety of plant species which would enrich the ecology of the area and add to the aesthetics.

The sewage generated from labors will be collected in collection tank and will be treated in septic tank with soak pit and domestic solid wastes generated will be handed over to outside vendors for further processing. Care will be taken that untreated wastes will not discharge on to the land. Hence no major impacts are envisaged on ecology.

The ecological and biodiversity assessment of study area around the proposed project has been carried out and is covered under baseline study.

#### **4.3.6 IMPACT ON SOCIO-ECONOMIC ENVIRONMENT**

There will be employment generation to the local people during the construction phase, as a significant proportion of the labour force is likely to be sourced from the local area. There will be employment opportunities for several skilled and unskilled workers in the area. There will be migration of labour force from outside the study area during construction phase which may put some pressure on the local settlement and resources. However, this impact is envisaged to be marginal and a temporary phenomenon.

#### **4.4 IMPACT MITIGATION MEASURES DURING CONSTRUCTION PHASE**

Depending upon the availability of the site details and impact characterization for the construction phase it is identified that, the construction phase impacts will be low, short term and reversible. The construction activity will be restricted within the proposed plot premises only.

Some of the mitigation measures adopted during construction phase of the project are:

- During construction phase, operations such as leveling, transportation, construction works, etc will be planned for most optimum schedule to reduce the impacts.
- Stockpiles of the fine materials should be wetted or covered with tarp during windy conditions.
- The dispersal of dust beyond the construction site will be reduced by erecting barricades around the site.
- By reducing the speed of a vehicle can reduce emissions by a large extent.
- Proper upkeep and maintenance of vehicles used for the purpose of transportation of construction materials.
- Workers on the site should be issued with dust masks during dry and windy conditions.
- Use of covering sheet should be done for construction trucks to prevent dust dispersion from the trucks.
- Sprinkling of water on construction site in order to suppress the dust.
- Maintenance of DG sets should be such that emissions shall comply with the norms notified by MoEF.
- By retaining sufficient vegetation at the construction site, since plants are good absorbers of Sulphur dioxide.
- Use of cleaner fuel for the construction vehicles.
- The construction activities will be carried out only during daytime in order to control noise pollution during night time.
- Schedule construction to avoid breeding times for fauna, or important recreation times for people.
- PPE will be provided to workers at site and construction machinery will be maintained properly to check on noise and emission levels within prescribed limits.
- The domestic wastewater will be collected in collection tank and Sprinkling of water on construction site in order to suppress the dust.

- The construction and domestic solid waste will be segregated and will not be allowed to mix with the construction waste.
- The generated domestic solid waste from labours and workers will be collected and handed over to authorized vendors.
- The excavated earth will be made use for refilling and landscaping within the site premises.
- The domestic solid and liquid wastes generated during the construction phase shall be properly handled such that there will not be direct discharge of untreated effluent on the land or water.

#### **4.5 ANTICIPATED IMPACTS AND MITIGATIVE MEASURES DURING OPERATION PHASE**

As the impacts during operational phase are long-term in nature, the activities related to the operational phase are identified and the impacts due to the same have been assessed and quantified. The details on impact of the project activity on each of the environmental attributes are discussed in subsequent sections.

##### **4.5.1 IMPACTS ON LAND ENVIRONMENT**

**IMPACTS ON LAND USE PATTERN:** The total land requirement for the proposed project is about 26.38 Acres. As per the Revised Master Plan of BDA-2015 of land use pattern planned for the planning district 3.16 (Map (a)) (Varthur), the project site is designated as Residential zone and a copy is enclosed as **Annexure-13** and also the land has been converted from agricultural to residential purposes. Hence there won't be any adverse impact on land use pattern.

**IMPACTS ON SOIL:** The soil quality in and around the site is likely to be affected by the disposal of untreated sewage. However, as the sewage will be treated to the urban re-use standards stipulated by the KSPCB, no deterioration of soil quality is expected due to the utilization of the same for gardening. The generated solid waste will be collected separately as biodegradable and recyclables, stored in the storage yard. Biodegradable wastes will be processed in organic waste converter and the recyclables will be given to waste recyclers for further processing. Fuel for DG sets and

waste oil from DG sets will be stored in leak proof containers on impervious floors. Hence, no significant impact on soil is envisaged during operation phase. However, the project site will witness additional tree plantation in the form of green belt development during operation phase, such plantation will stabilize the soil and helps to recover from the adverse impacts of the construction phase.

**MITIGATION MEASURES:**

Impact on land use pattern from the proposed project is nil, following are the few mitigation measures will be adopted to prevent the impact on soil:

- Domestic solid wastes will be properly managed which comprises of organic and inorganic wastes. Since it is a residential project majority of the waste comprises of organic fraction which will be converted in to compost through organic waste converter and shall be used as manure.
- The inorganic wastes generated will be handed over to authorized recyclers for further processing.
- The container and bins used for collection of solid waste will be of closed type so that the waste is not exposed and thus the possibility of spreading of disease through flies and mosquitoes is minimized.
- By proper supervision of solid wastes collection system so that quick and regular removal of waste from the dustbin is practiced.
- Separate collection bins are provided at each block to collect the solid waste generated by residents.
- Hazardous wastes like waste oil from DG sets, used batteries etc shall be handed over to KSPCB authorized hazardous waste recyclers for further processing.
- The sludge from STP shall be used as manure for landscaping.
- The DG oil/ fuel, used oil/ fuel shall be stored at the designated place on the impervious floor in a closed container.

**4.5.2 IMPACTS ON AIR ENVIRONMENT**

The impact on air quality is assessed based on emissions of the proposed residential development. During operation phase of the project, various daily activities

may have impact on air environment and its parameters. Operation phase will involve emission from vehicular movement, from diesel generators and negligible emissions from sewage and solid waste handling and disposal.

The project is not significant from air pollution angle as there are no continuous air pollution sources. DG sets which are used purely as standby and shall be operated only in case of power outage/failure which are the only significant sources of air pollution during operational phase. As these DG sets are provided with adequate stack height as prescribed by CPCB, no impact of the same on air quality is envisaged. The emissions from the operation of DG sets will be in compliance with Environment (Protection) Second Amendment Rules, 2002. There will be 2×380 KVA, 11×500 KVA capacities of DG sets to be required as a power backup.

**MITIGATION MEASURES:** Following are the few mitigation measures, adopted to prevent the impact on Air Environment:

- Use of low-sulfur fuels to DG sets in order to reduce emissions. DG will be used as stand-by unit and usage will be restricted and will be used only in case of power failure.
- Emissions from DG sets shall comply with emission norms notified by CPCB.
- Regular monitoring and maintenance of ambient air quality parameters will be done, which shall be within the norms notified by CPCB (NAAQS), in order to check the surrounding air quality.
- Usage of speed limits will be adopted to reduce airborne fugitive dust caused by vehicular traffic from the project.
- Developments of greenbelt to a greater extent within the project site since plants are the good absorbers of SO<sub>2</sub>.
- The vehicles used should have pollution under control certificate.

#### **4.5.3 IMPACTS ON WATER ENVIRONMENT**

The total water requirement for the proposed project is 1,238 KLD which will be met from Borewell. The wastewater generated to the amount of 1,115 KLD from the project will be treated to the urban reuse standards stipulated by KSPCB. The

wastewater from the proposed project involves wastewater from kitchen, civic amenities, residents etc which will be treated to the urban reuse standards and used for secondary purposes such as flushing and for gardening purposes.

The total land available for greenbelt and Park development is about 39,006.55 Sqmt (i.e. 38.98% of the net site area). As per the observation of the soil, the category of the soil can be identified as sandy soil. With a minimum STP treated water application for landscape area including park and open space, for such soil types, it has been estimated that nearly 311 KLD of treated sewage can be applied on this soil.

The total treated sewage water discharge from the project is around 1,059 KLD. Out of this about 311 KLD can be used for gardening and about 524 KLD will be used for flushing, 224 KLD will be used for car & floor washing.

As the sewage will be treated to meet the urban reuse standards and the same would be reused, there is no adverse impact on ground and surface water is envisaged.

**MITIGATION MEASURES:** Following are the few mitigation measures will be adopted to prevent the impact on Water Environment.

- The sewage generated during operation phase will be collected through an internal network of sewerage system and discharge into the STP of capacity 1300 KLD based on Sequential Batch Reactor (SBR) technology and the treated water quality shall be conformed to the standards laid by KSPCB. Treated water will be reused for toilet flushing and for landscape development.
- Provision of dual piping system in order to utilize the treated sewage water for non potable purposes such as flushing and for landscaping etc.
- Installation of flow meters at water inlet points in order to monitor the consumption of water as per Water Cess Act 1977.
- Use of water efficient fixture units which consume less amount of water compared to conventional type of units.
- Regular analysis of the STP treated water before using it for secondary purposes, which should comply with the KSPCB standards.



- By adopting rain water harvesting system with recharge pits and the reuse of roof top harvested rain water to the maximum extent to reduce the consumption of fresh water considerably after necessary treatment through softener.
- By the proper maintenance of sewer and storm water drainage system.
- Immediate attention towards the leaky plumbing fixtures.

**TABLE-4.5: QUALITY OF TREATED SEWAGE FOR URBAN REUSE**

| Sl.No. | Parameters                  | Standards |
|--------|-----------------------------|-----------|
| 1      | p <sup>H</sup>              | 6-9       |
| 2      | BOD <sub>5</sub> mg/l       | ≤ 10      |
| 3      | Turbidity, NTU              | ≤ 2       |
| 4      | E-Coli                      | None      |
| 5      | Res. Cl <sub>2</sub> , mg/l | ≥ 1       |

**Note:** Urban reuse includes landscape irrigation, vehicle Washing, toilet flushing, use in fire protection

#### **STORM WATER MANAGEMENT**

As the project location is blessed with fairly good rainfall, it is planned to collect the storm water at different gradients of the location. There will be rainfall runoff from building roof-tops, roads, pavements and greenbelt area. Necessary provision will be made to collect the quantity of rainfall runoff during the most rainy day of season. Necessary rain harvesting pit / recharge pit at regular intervals have been envisaged. Internal garland drain with RCC precast perforated cover and a RCC precast recharge pit will be provided around the periphery of property.

#### **RAINWATER HARVESTING FACILITIES:**

As the growth of Bengaluru city is far ahead of the rate at which the water supply system is being upgraded, it becomes necessary to think of alternative source of water for the daily needs for secondary purposes like washing, gardening etc. In these lines, rain water harvesting is gaining importance and has been a part of building by-laws. The facilities to be established for rainwater harvesting include carriage (piping) system, pre-treatment unit (filtration) and a storage tank.

**Design details:**

Q = Runoff in m<sup>3</sup>/sec

I = Intensity of Rainfall in mm/hr

A = Drainage area in hectares

C = Co-efficient of runoff varies on type of surface

Runoff co-efficient:

Water tight roof surface- 0.95

Parks, lawn, Garden - 0.10

Roads / Pavements - 0.70

Open grounds, unpaved street - 0.3

**I. Total Runoff from roof top (Terrace, m<sup>3</sup>)**

= (Intensity of rainfall X Harvestable Area X Impermeability Factor)/360

= (75 X 1.38 X 0.95) /360 = 0.273 m<sup>3</sup>/day

Data Assumed:

Considering 20 min of rainfall

Volume of rainwater available for harvesting is 90% = 294 cum

**2×160 cum** of roof rain water tank will be provided.

**II. Runoff from Roads & Paved Area (Cum/Day)**

= (75 X 4.74 X 0.70) /360 = 0.69 m<sup>3</sup>/day

Data Assumed:

Considering 10 min of rainfall

Volume of rainwater available for harvesting is 60% = 374 cum

**III. Runoff from Landscape Area (Cum/Day)**

= (75 X 1.08 X 0.10) /360 = 0.022 m<sup>3</sup>/day

Data Assumed:

Considering 15 min of rainfall

Volume of rainwater available for harvesting is 40% = 8 cum

**Recharge pit calculation:**

Data Assumed:

Infiltration rate is 15cm/hr = 0.15m/hr

Soak pit of 1.2m diameter is considered

Area of each Soak pit = 6.8 Sqmt

Total quantity of water percolating per hr = 2.034

Quantity of water available for percolation = 100 cum

No. of recharge pits provided = 93 cum

Excess water is stored in open wells = 273 cum

Roof rain water will be collected in roof rain water collection tank of capacity 2×160cum and same will be utilized after prior treatment. 93 nos of recharge pits will be provided to recharge the ground water within the site and the plumbing plan is enclosed as **Annexure-14**. Hence excess runoff finds its way to storm water drain running near the project site.

#### **4.5.4 IMPACTS ON NOISE ENVIRONMENT**

The noise impacts are analyzed depending upon the people likely to be affected viz., people who are working near sources. People working near the source need damage risk threshold criteria for hearing, while the people who stay nearby need annoyance and psychological damage as the criteria for noise impact analysis. The noise levels in the work environment are compared with the standards prescribed by CPCB.

The major noise generating units in a proposed plant will be mainly from utility section such as DG. However, DG is proposed as standby arrangement. Besides, it will be located in closed and acoustically designed compartment (noise attenuating enclosure) hence no impact due to noise is envisaged.

**MITIGATION MEASURES:** Following are the few mitigation measures will be adopted to prevent the impact on Noise Environment

- D G sets will be provided with acoustic enclosure.
- Vehicles and machinery will be maintained properly.

- Regular monitoring of noise level will be carried out and corrective measures in concerned activity and machinery will be adopted accordingly.
- Sufficient green belt development will be done to help in reducing noise levels in the campus.

#### **4.5.5 IMPACTS OF SOLID WASTE ASPECTS**

Total quantum of solid waste generated from the proposed project will be 4.2MT/day. Out of which, organic waste contributes to 50% i.e, 2.1MT/day and In-organic waste contributes to 50% i.e, 2.1MT/day, if this quantum of waste is not scientifically handled and discarded improperly, leads to leachate formation under moisture conditions or when layers come in contact with water, affecting ground water through leachate percolation slowly into subsurface soil. Also, this leads to losing the fertility of soil and intern odour nuisance / foul smell and attracts flies and helps in breeding of mosquitoes/flies/rats and may resulting in diseases causing serious health concern.

Improper maintenance of used oil from the operation of DG sets will have an impacts on the groundwater on long term through seepage into subsurface soil layers and indirectly aids in losing the fertility of the area. The waste oil when in contact with human skin leads to irritation to eyes/skin/nose causing health concern.

56kg/day of STP sludge will be generated which needs to be properly disinfected, as this may pose health concern for operating staff and resident's exposure to these areas will feel uncomfortable and experience the odour nuisance/ foul smell.

Open burning of solid waste leads to emissions escaping into the atmosphere resulting air pollution and also affects the in-house & neighborhood residents. Generation of household hazardous wastes like expired cosmetics bottles, batteries, cleaning agents, paints, mosquito/cockroach spray containers, and insecticides. If these are not disposed properly, there will be chances of contamination of groundwater through percolation of toxic constituents into subsurface soil layers especially during monsoon period and when it contact with human due to touch/inhalation/ingestion or by any means will seriously lead to health problems.

E-waste from the entire project will be generated includes used mobiles/batteries, expired CFLs, tube lights, electrical wires, used/old computers, CDs. E-wastes mainly contain heavy metals & toxic constituents and if unscientifically handled/managed, will leads to serious health concerns especially when they are burnt & discarded improperly.

**MITIGATION MEASURES:** Following are the few mitigation measures will be adopted to prevent the impact on Environment

- Implementation of Organic Waste Converter for treating organic solid wastes wherein the end product (manure) can be reused within the site premises for horticulture/ landscape development. Inorganic waste will be handed over to waste collector for recycling.
- Sludge generated from STP will be reused as manure for greenery development purposes.
- Waste oil generated from the DG sets will be collected in leak proof barrels and handed over to the authorized waste oil recyclers.
- Bio medical waste will be collected and stored in different colored bins as per the BMW rules, 1998 and dispose of the same to KSPCB authorized reprocessor.
- E-Wastes will be collected & stored in bins and disposed to the authorized & approved KSPCB E-waste processors.

#### **COMPOSTING PROCESS USING "ORGANIC WASTE CONVERTER"**

**Process:** The Organic Waste is converted into homogenized odour free output within 15 minutes through Bio Mechanical Process and is converted into COMPOST within two weeks which can be used in kitchen gardens and landscape applications.

**Area Required:** An area of 400 Sqmt earmarked housing the Organic waste converter.

**Environment Friendly:** The system takes only 15 minutes to convert the Organic Waste into homogenized odour free output. Hence there is no foul smell. Consequently there is no fly menace or nuisance from rodents, dogs, insects Etc.

**Treatment Process Description:**

- The Organic Waste is collected from each apartment, and is segregated for removal of plastics, glass etc. The Organic waste is fed into a mechanical unit which converts this into homogenized, crushed odor free output with in fifteen minutes.
- This homogenized odour free output will go to the curing system for stabilization.
- The process is controlled aerobic microbial decomposition which includes initial low p<sup>H</sup> levels then high p<sup>H</sup> levels and stabilizes.

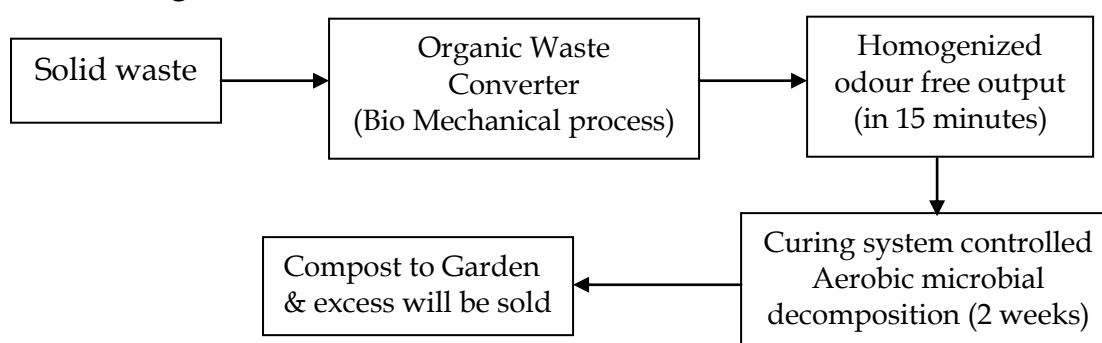
#### Special Advantage of the system:

- **Power Requirement:** - The Power required for operating this plant is lowest as the power is for 15 minutes for each batch. And the balance 14 days is natural aerobic microbial process.
- **Garbage Disposal:** - The storage, transportation and disposal of wet garbage is not required as it is safely treated at source and converted to high quality manure.

#### Advantages over other systems:-

- The manure is weed free and pathogen free as the process is aerobic.
- The surplus manure will be sold out for revenue generation.

#### Process of Organic Waste Converter:



#### 4.5.6 IMPACTS ON ECOLOGY

The ambient air concentration of the pollutants released within the site viz. SO<sub>2</sub>, SPM, RSPM, HC, & CO are well below the prescribed NAAQS and the sewage



generated is also treated and recycled in compliance with the prescribed standards, no adverse impact of air pollutants and wastewater on the ecology is envisaged. On the other hand, extensive plantation and landscaping within the site will enhance its existing ecological value.

Proposed project is a residential development and is presently surrounded with other similar project and expected the same in future, therefore there won't be any adverse impact on the ecology.

**MITIGATION MEASURES:**

Vegetation is the natural extension of the soil ecosystem on a site. It can provide summer shade, wind protection, and a low-maintenance landscape that is adapted to the local environment. Unfortunately, the common practice is to remove the existing landscape cover and replace with a generic, water and maintenance-intensive lawn. Most of the trees present in the site will be retained for landscaping and the plan is enclosed as **Annexure-15**.

It is proposed to develop a minimum 38.98% of the total site area as greenbelt area which amounts to about 39,006.55 Sqmt. Most trees proposed in the design are indigenous trees and native type of trees. Some trees such as the Temple tree, Neem & Champaka and palms have been added to the planting scheme for their aesthetic value. Annual budget of require amount shall be allocated for this purpose. The plantation schedule shall be completed within construction period of the project.

Following approach will be adopted for Vegetation and Ground Management.

- It is planned to include an ecologically knowledgeable landscape architect as an integral member of the design team.
- Preservation of existing vegetation, especially native plants. Avoid fencing off property where possible to make landscape available to community increasing project integration.
- Avoid replacing mature trees with young seedlings.
- Protect existing plants during construction. Delineate the "drip line" around trees and demark or fence off areas to avoid damage.

- Contain heavy equipment and stockpiling areas to predefined areas.
  - Design new plantings as diverse communities of species well adapted to the site.
- Plant native species of varying ages. Select vegetation that attracts wildlife.

TABLE-4.6: LIST OF EXISTING SPECIES

| Sl. No       | TREE VARIETY     |                                 | Approx. Nos./ Qty |
|--------------|------------------|---------------------------------|-------------------|
|              | Common Name      | Botanical Name                  |                   |
| 1.           | Neem Tree        | <i>Azadirachta indica</i>       | 9                 |
| 2.           | Mango Tree       | <i>Mangifera indica</i>         | 142               |
| 3.           | Tamarind         | <i>Tamarindus indica</i>        | 10                |
| 4.           | Cassia Tree      | <i>Cassia glauca</i>            | 15                |
| 5.           | Indian Kino tree | <i>Pterocarpus marsupium</i>    | 19                |
| 6.           | Subabul          | <i>Leucaena leucocephala</i>    | 22                |
| 7.           | Jackfruit        | <i>Artocarpus heterophyllus</i> | 6                 |
| 8.           | Amla             | <i>Phyllanthus emblica</i>      | 11                |
| 9.           | Jamun            | <i>Syzygium cumini</i>          | 13                |
| 10.          | Others           | --                              | 44                |
| <b>TOTAL</b> |                  |                                 | <b>291 Nos.</b>   |

TABLE-4.7: LIST OF SPECIES FOR THE PROPOSED PROJECT

| Sl. No | TREE VARIETY                          |                               | Approx. Nos./ Qty |
|--------|---------------------------------------|-------------------------------|-------------------|
|        | Common Name                           | Botanical Name                |                   |
| 1.     | Neem Tree                             | <i>Azadirachta indica</i>     | 15                |
| 2.     | Aarali Tree                           | <i>Ficus religiosa</i>        | 05                |
| 3.     | Aala Tree                             | <i>Ficus benghalensis</i>     | 05                |
| 4.     | Mango Tree                            | <i>Mangifera indica</i>       | 05                |
| 5.     | Akasha mallige                        | <i>Millingtonia hortensis</i> | 100               |
| 6.     | Sampige Tree                          | <i>Michelia champaca</i>      | 100               |
| 7.     | Singapore cherry                      | <i>Muntingia calabura</i>     | 50                |
| 8.     | Nerale Tree                           | <i>Syzygium cumini</i>        | 05                |
| 9.     | Honge Tree                            | <i>Pongamia pinnata</i>       | 50                |
| 10.    | Badami Tree                           | <i>Terminalia Catappa</i>     | 20                |
| 11.    | Silver Oak                            | <i>Grevillea Robusta</i>      | 100               |
| 12.    | Silver Trumpet Tree                   | <i>Tabebuia argentea</i>      | 40                |
| 13.    | African Tulip Tree                    | <i>Spathodia companulata</i>  | 20                |
| 14.    | Jacaranda Tree                        | <i>Jacaranda Mimosifolia</i>  | 15                |
| 15.    | Indian Laburnum                       | <i>Cassia Fistula</i>         | 25                |
| 16.    | Muttuga Tree<br>(Flame of The Forest) | <i>Butea monosperma</i>       | 10                |
| 17.    | Queens Crape-Myrtle                   | <i>Lagerstromia speciosa</i>  | 25                |
| 18.    | Green bamboo                          | <i>Bambusoideae</i>           | 50                |

| 19           | Yellow bamboo                          | <i>Bambusa vulgaris</i>           | 50                |
|--------------|----------------------------------------|-----------------------------------|-------------------|
| <b>TOTAL</b> |                                        |                                   | <b>690 Nos.</b>   |
|              |                                        |                                   |                   |
| Sl. No       | SHRUB VARIETY                          |                                   | Approx. Nos./ Qty |
|              | Common Name                            | Botanical Name                    |                   |
| 1            | Red Bird of Paradise                   | <i>Ceasalpinia pulcherrima</i>    | 150               |
| 2            | Red Ginger                             | <i>Alpinia purpurata</i>          | 270               |
| 3            | Crepe Jasmine                          | <i>Tabernaemontana divaricata</i> | 260               |
| 4            | Oleander/Dwarf Karabi                  | <i>Nerium oleander dwarf</i>      | 560               |
| 5            | Great Bougainvillea                    | <i>Bougainvillea spectabilis</i>  | 245               |
| 6            | Gold Shower                            | <i>Galphimia glauca</i>           | 535               |
| 7            | Golden Dewdrop                         | <i>Duranta repens</i>             | 600               |
| 8            | Chinese Rose                           | <i>Hibiscus rosa-sinensis</i>     | 400               |
| 9            | Golden shrimp plant/<br>Lollypop plant | <i>Pachystachys lutea</i>         | 500               |
| <b>TOTAL</b> |                                        |                                   | <b>3520 Nos.</b>  |

| Sl. No       | GROUND COVER VARIETY |                               | Approx. Nos./ Qty |
|--------------|----------------------|-------------------------------|-------------------|
|              | Common Name          | Botanical Name                |                   |
| 1            | Urn Plant            | <i>Aechmea fasciata</i>       | 200               |
| 2            | Barbados Lily        | <i>Hippeastrum puniceum</i>   | 250               |
| 3            | Gazania              | <i>Gazania rigens</i>         | 80                |
| 4            | Bush Lily            | <i>Clivia miniata</i>         | 200               |
| 5            | Lily Rose            | <i>Zephyranthes rosea</i>     | 150               |
| 6            | Foxtail Fern         | <i>Asparagus Myers</i>        | 250               |
| 7            | Bamboo Grass         | <i>Bamboo grass</i>           | 400               |
| 8            | Mexican Heather      | <i>Cuphea hyssopifolia</i>    | 300               |
| 9            | Begonia              | <i>Begonia Semper Florens</i> | 600               |
| 10           | Texas Sage           | <i>Salvia coccinea</i>        | 150               |
| <b>TOTAL</b> |                      |                               | <b>2580 Nos.</b>  |

#### 4.5.7 IMPACTS ON SOCIO-ECONOMIC ASPECTS

The proposed development is in a favorable position to generate and sustain stable levels of employment, wage levels, continued improvements in living standards and the quality of life in the project surrounding area.

As the proposed project brings employment generation, both skilled and unskilled, it is obvious to assume that, all the economic activities in the project area would induce considerable improvement in the socio-economic levels of people. The

occupational phases of the project will have a potentially positive impact on local economy and society. Additionally, it has an affirmative impact and induces development of other sectors like school, colleges, health centers recreational centers etc. The impact of human settlement is expected to be positive, as rises the living standards of the people, literacy rate, and working class of people and also generates indirect employment.

#### **4.5.8 IMPACTS OF NATURAL HAZARDS**

There will be no impact of natural hazards on the proposed project, since the proposed project site comes under seismic zone – II, which is a low damage risk zone. Hence possibility of any natural hazard and risk would be nil. Due to the susceptibility of the project area to natural hazard such as cyclones/storm, flooding, earth quake, tsunami etc which would result on substantial damage and loss to the proposed project. Hence consideration must be given to these possibilities. Proper emergency response and action plan and disaster management plan should be followed in order to control any type of disaster from these natural hazards.

#### **4.6 OTHER CUMULATIVE MITIGATION MEASURES**

Following are the other cumulative mitigation measures adopted in the proposed project

- Renewable energy will be used throughout the residents, wherever it is possible and practical to do so.
- Regular inspections of drainage systems will be performed to ensure that the drains remain clear of blockages to safeguard against flooding.
- Selection of plants for landscaping should consider the local habitat suitability, feeding trees, trees of national interest, flowering trees and shrubs.
- Preventing direct channelling of storm water to the existing lake.
- Public health and safety in the event of predictable events.
- Establish regulations and promote environmental awareness amongst the residents, visitors and staff e.g. using posters or signs.
- By establishing EMP cell.

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**CHAPTER - 5****ALTERNATIVE TECHNOLOGIES AND SPECIFIC STUDIES****5.1 GENERAL**

This chapter deals with the consideration of alternative site and alternative technologies to be used in building materials, in energy conservation. And in transport, which details the traffic impact study, and its management measures and other alternatives if any for the proposed project.

The proposed project involves mainly two phases i.e. construction phase and operation phase. Since it is a residential apartment project, there will be general activities, during construction phase and operation phase of the project; hence there will not be much alternative option exists. However some optimum alternatives can be applied for the proposed development which is discussed in this chapter.

**5.2 NEED OF ALTERNATIVES**

A good part of the world's energy is consumed by the construction related projects. Building is dependent on endless supply of high quality materials and energy resources. Buildings on a global scale consume about 40% of the raw stone, gravel and sand, 40% of energy and 16% of the water each year. This result in depletion of non-renewable materials and resources, production of waste bi-products, release of pollutants and deterioration of the air, water, soils and the habitat that surrounds it.

It is necessary that one should try to find various alternatives and what is environmentally best being preferred. Hence we are in a great need of saving energy consumption through the adoption of alternative technologies for the upcoming projects.

The present time demands use of sustainably managed materials. These are the materials that are environmentally preferable and have a mitigated degree of adverse impact on environment and human ecosystem when compared with equivalent products for the same application. Use of sustainably managed materials is an environmental responsibility in contributing towards a sustainable habitat. Their basic

characteristics that are required in the present scenario are, ability of natural resource conservation, low embodied energy, potential of recyclability and reuse and low emission levels of toxic substances or pollutant release in each stage of material life cycle.

### **5.3 ALTERNATIVE TECHNOLOGIES**

#### **5.3.1 BUILDING MATERIALS**

The conventional practice of clay, brick consumes large quantity of energy in terms of coal and other fuels which are primarily non-renewable and highly polluting. Water requirements of building industry are also very high. Steel which is used in the construction process is manufactured by non-renewable resource. Normally conventional materials used for construction are non-renewable sources.

Use of alternative technologies for each component of the buildings of envelope, superstructure, finishes and the road and surrounding areas are discussed in detail.

Some of proposed building materials are given below:

- Brick and block products with waste and recycled contents such as fly ash, blast furnace slag, sewage sludge, waste wood fiber etc.
- Fly ash based lightweight aerated concrete blocks can be used for walls.
- Perforated bricks can be used for wall structures.
- Use of precast walls, roof, staircase, etc.
- Use of renewable timber for doors and windows
- Use of steel manufactures from recycled content
- Saw dust based doors and window frames
- Ferro-cement shutters, PVC doors and windows, Rice husk boards, Natural fiber-reinforced polymer composite door panels
- Alternatives for finishes include Fly ash, Ceramic tiles, Terrazzo floors

The use of the alternatives for building materials will help reduce the use of non-renewable resources and impact on natural resources.



**5.3.2 GREEN BUILDINGS**

The appearance of a Green Building will be similar to any other building. However, the difference is in the approach, which revolves around a concern for extending the life span of natural resources; provide human comfort, safety and productivity. This approach results in reduction in operating costs like energy and water, besides several intangible benefits. Under the initiative of green building concept we have obtained Pre-certified Gold from Indian Green Building Council (IGBC) for the project which is enclosed as **Annexure-16**.

Some of the salient features of a Green Building are:

- Minimal disturbance to landscapes and site condition
- Use of Recycled and Environmental Friendly Building Materials
- Use of Non-Toxic and recycled/recyclable Materials
- Efficient use of Water and Water Recycling
- Use of Energy Efficient and Eco-Friendly Equipment
- Use of Renewable Energy
- Indoor Air Quality for Human Safety and Comfort
- Effective Controls and Building Management Systems

**Issues in Green Building:**

- Energy Efficiency and Renewable Energy
- Building orientation to take advantage of solar access, shading, and natural lighting
- Effects of micro-climate on building
- Thermal efficiency of building envelope and fenestration
- Properly sized and efficient heating, ventilating and air-conditioning system
- Alternative energy sources
- Minimization of electric loads from lighting, appliances, and equipment
- Utility incentives to offset costs

**Direct and Indirect Environmental Impact:**

- Integrity of site and vegetation during construction

- Use of integrated pest management
- Use of native plants for landscaping
- Minimization of disturbance to the watershed and additional non-point-source pollution
- Effect of materials choice on resource depletion and air and water pollution
- Use of indigenous building materials
- Amount of energy used to produce building materials

**Resource Conservation and Recycling:**

- Use of recyclable products and those with recycled material content
- Reuse of building components, equipment, and furnishings
- Minimization of construction waste and debris through reuse and recycling
- Easy access to recycling facilities for building occupants
- Minimization of sanitary waste through reuse of grey water and water-saving devices
- Use of rainwater for irrigation
- Water conservation in building operations
- Use of alternative wastewater treatment methods

**Indoor Environmental Quality:**

- Volatile organic compound content of building materials
- Minimization of opportunity for microbial growth
- Adequate fresh air supply
- Chemical content and volatility of maintenance and cleaning materials
- Minimization of business-machine and occupant pollution sources
- Adequate acoustic control
- Access to daylight and public amenities

**Community issues:**

- Access to site by mass transit and pedestrian or bicycle paths
- Attention to culture and history of community

- Climatic characteristics as they affect design of building or building materials
- Local incentives, policies, regulations that promote green design
- Infrastructure in community to handle demolition-waste recycling
- Regional availability of environmental products and expertise

Building Green concentrates on one key aspect of the greening process: the use of plants in and around urban buildings. Green buildings and green spaces together define an integrated approach to plant life in cities that is central to any green programme. Trees and shrubs can help reduce overall energy use in buildings. The amount of energy saved depends on the building type, choice of tree species, positioning around the building and the prevailing climate.

Balconies and small terraces have become standard architectural features for multiple dwelling developments. The balcony garden is a natural development of the balcony's role as a link between interior and exterior environments.

Green walls - Modern cities provide enormous areas of wall space, in many cases stretching high above the street. Not all of this space is appropriate for growing plants, but much of it is - certainly much more than has been utilized in recent years.

Roofs present by far the most significant opportunities for the greening of buildings. Many cities have millions of Sqmt of unused and unattractive roofs. They represent enormous wasted opportunities for improving the quality of city life. Some of the advantages for green roof include:-

- Protection of roof surface from ultra-violet radiation and mechanical damage
- Thermal insulation
- Acoustic insulation
- Lower maintenance costs for roofing materials
- Reduction of storm water runoff
- Gardens for inhabitants of buildings
- Masks ugly rooftops
- Complements building forms
- Absorption of CO<sub>2</sub>, some air pollutants and dust

The basic benefits of Green Building systems are,

- Up to 30% reduction in energy consumption
- Limited waste generation due to recycling
- Less consumption of water
- Reduced pollution load & liability

### **5.3.3 ENERGY CONSERVATION**

There is a need to adopt energy efficient technologies for conservation of energy. The proposed project is a development of residential apartment project and few energy conservation measures are adopted by using energy efficient devices and through solar energy. The details of power requirement and energy savings would be achieved is as detailed below:

Construction of the buildings will require additional power and energy requirement. To minimize the energy consumption, buildings will be designed and constructed according to Energy Conservation Building Code 2007 which sets minimum energy standards for buildings. The following methods could be implemented to the proposed buildings.

Some of the energy saving options which will be informed to all the occupants and Maintenance staffs;

- Turn off all lights when not in use, especially in common rooms.
- Clean or replace your air-conditioner filters.
- Usage of Solar water heating systems
- Usage of energy efficient equipment and appliances.
- Usage of CFL/LED lamps.
- Use of glazed windows with proper sealing to minimize infiltration
- Planting deciduous varieties of trees on the south and on the west will help keep buildings cool in the summer and allow sun to shine in the windows in the winter.
- Shade trees will save up to 40% on your summer cooling costs when the trees mature.

Energy conservation measure which will be adopted by Assetz in proposed project: The following energy conservation measures are adopted:

- Use of hollow concrete block masonry with high thermal resistance to reduce cooling load
- Use of copper wound transformer
- Use of under deck insulation in the roofs to reduce cooling load
- Use of high efficiency lamps CFL/LED
- Use of occupancy sensors and dimmers for lights in the parking areas
- Use of LED light fittings or star rated light fittings in common areas
- Use of Variable frequency drives motors in the diesel generators and pumps.

**TABLE-5.1: ENERGY SAVINGS DETAILS**

| <b>Sl. No</b> | <b>Description</b>             | <b>In %</b>        |
|---------------|--------------------------------|--------------------|
| 1.            | Using solar energy             | 8.1                |
| 2.            | Using copper wound transformer | 1.7                |
| 3.            | Using CFL & LED lights         | 10.9               |
|               | <b>Total</b>                   | <b>20.7 say 21</b> |

As the proposed project is a development of residential apartment, no walls are made of glass; wherein only windows have glazed doors. Clear glasses are used for the windows, which is of low emission & low solar heat gain characteristics.

#### **5.3.4 TRANSPORTATION**

Some of the factors are important and must be taken into the consideration, while planning, are the movement of heavy traffic loads and operation of construction machinery. Construction machinery due to its operation produces smoke, dust and noise and vibration. Internal road design should be done with due consideration for environment, and safety of the people residing or working near the roads. Proper sidewalk should be provided for the residence to commute.

The width of sidewalk depends upon the expected pedestrian flows and should be fixed with the help of guidelines given by IRC in IRC: 103-1988.

- For the proposed residential development 10% additional Car Parking facility is proposed as per NBC 2005.

- Parking facilities at basement, ground and first floors is proposed to reduce the heat island effect.
- Internal circulation to provide for movement of fire tender, paving that permits infiltration of rain water, avoidance of very sharp and blind corners
- Elimination of risks to children and old people in crossing the internal roads to reach play areas and recreational facilities.

A detailed Traffic Study and Management Plan Report are enclosed as **Annexure-9**.

#### **5.4 ALTERNATIVE SITE**

No alternative sites were selected as the proposed project is a development of residential apartment and also the project site comes under residential zone as per Revised Master Plan of 2015. The location of the site is well situated with proper drainage and approach roads and other infrastructural facilities, also sufficient land is available for the proposed development including landscape area.

The development of the proposed project will be under taken as per applicable statutory guidelines and accordingly required statutory clearances will be obtained for the proposed development of the project.

The important supporting factors which made the proponent to select the particular site are:

- There is availability and easy accessibility of all basic facilities like water, power, man power, fuel, raw materials etc.
- There is availability of workers in nearby places, during construction as well as in operation.
- There is availability of good communication and transportation facilities.
- Proposed project site is around 17 km from Bengaluru city railway station and bus terminal, which is well connected with the other parts of the state.
- Proposed project site is around 35 km from Kempegowda International Airport.
- The project site is situated in Bangalore city, which is under Bruhath Bengaluru Mahanagara Palike (BBMP) limits.

- No ecologically sensitive area falls within 10 km radial distance around the proposed project site.

By considering all these criteria's, selection of the project site has been done, hence for the proposed project selection of the alternative site is not required.



**CHAPTER – 6****ENVIRONMENTAL MONITORING PROGRAM****6.1 INTRODUCTION**

Environmental monitoring is important parameter to assess the status of environment during construction and operation phases of the project. Environmental monitoring program includes the technical aspects of monitoring and monitoring the effectiveness of mitigation measures (including measurement methodologies, frequency, location, and data analysis, reporting schedules, emergency procedures, detailed budget and procurement schedules). The details include summary matrix of environmental monitoring, location of monitoring stations, frequency of sampling, method of sampling analysis, parameters of monitoring and data evaluation during construction and operation stages; requirement of monitoring facilities; comparison with base line data and compliance to accepted norms & reporting system including plantation monitoring programme.

An impact assessment study comprises of two main phases, in relation to that, Environmental Monitoring Program will be carried out in the same two main phases and are:

- Assessment of the present environmental condition, (Baseline).
- Prediction of the impact of future development.

Regular monitoring of environmental parameters is more importance to assess the status of the environment during operation of the project. Baseline conditions will serve as an indicator for any deterioration in environmental conditions due to operations of the project.

As the impact assessment study is carried out for a short period of time and the collected data cannot bring out all variations persuaded by the natural & human activities. Therefore, regular monitoring programme of the environmental parameters

is essential to take into account the changes in the environmental quality. The objectives of monitoring are:

- To verify the results of the impact assessment study in particular with regards to new development.
- To follow the trend of parameters which have been identified as critical;
- To check or assess the efficiency of the controlling measures.
- To establish a data base for future Impact assessment studies for new projects.
- To ensure that new parameters, other than those identified in the impact assessment study, do not become critical through the commissioning of new development.
- To check assumption made with regard to the development and to detect deviations in order to initiate necessary measures; and
- To establish a data base for future Impact assessment studies for new projects.

The attributes, which merit regular monitoring, are specified underneath:

- Ambient air quality
- Ambient noise quality
- Water and wastewater quality
- Landscape development

The post project monitoring to be carried out at the project is discussed in the following sections.

## **6.2 MONITORING AND REPORTING PROCEDURE**

Regular monitoring of important and crucial environmental parameters is of immense importance to assess the status of environment during operation of the project. With the knowledge of baseline conditions, the monitoring programme can serve as an indicator for any deterioration in environmental condition due to the construction of residential apartment and its operation and suitable mitigatory steps could be taken in time to safeguard the environment. Monitoring is as important as

that of control of pollution since the efficiency of control measures can only be determined by monitoring.

The monitoring program would be a comprehensive monitoring programme as suggested underneath. Environmental attributes should be monitored as given below:

### **6.2.1 AMBIENT AIR QUALITY**

#### **CONSTRUCTION PHASE:**

During baseline study, i.e. before construction of proposed building; air monitoring has been carried out at nine locations, including project site as well as another eight different stations within the study area of 10 km and the results are discussed in chapter-3.

The ambient air quality monitoring shall be carried out during the construction phase of the project. Once the construction activity starts, regular monitoring of the ambient air, once in three months will be carried out at project site.

The parameters to be monitored are Particulate Matter-2.5  $\mu\text{g}/\text{m}^3$ , Particulate Matter-10  $\mu\text{g}/\text{m}^3$ , Sulphur Dioxide ( $\text{SO}_2$ ), Nitrogen Dioxide ( $\text{NO}_2$ ), Ozone, Lead, Carbon monoxide, Ammonia, Benzene, Benzo (a) Pyrene (BaP), Arsenic, and Nickel.

#### **OPERATION PHASE:**

Once the proposed residential apartment would start operation, regular monitoring of the ambient air, once in six months will be carried out at the site.

The parameters to be monitored are Particulate Matter-2.5 $\mu\text{g}/\text{m}^3$ , Particulate Matter-10 $\mu\text{g}/\text{m}^3$ , Sulphur Dioxide ( $\text{SO}_2$ ), and Nitrogen Dioxide ( $\text{NO}_2$ ).

### **6.2.2 AMBIENT NOISE QUALITY**

#### **CONSTRUCTION PHASE:**

During baseline study, i.e. before construction; noise monitoring has been carried out at nine locations, including project site as well as another eight different locations within the study area of 10 km and the results are discussed in chapter-3.

Noise emissions from vehicular movement, operation of various construction equipments shall be monitored during construction phase. The frequency of

monitoring will be once in three months at two stations within in the premises of the project site.

**OPERATION PHASE:**

Ambient noise level within the project site will be monitored at two locations once in six months during the operation phase of the project in order to ensure that noise levels are within the permissible limits as prescribed by the Board.

**6.2.3 WATER AND WASTEWATER QUALITY**

**CONSTRUCTION PHASE:**

During baseline study, i.e. before construction; ground water quality analysis has been carried out at nine locations, including project site as well as another eight different locations within the study area of 10 km and the results are discussed in chapter-3.

Similarly, during baseline study; lake water quality analysis has also been carried out at surface water (lake) within the study area of 10 km and the results are discussed in chapter-3.

Once the construction of the project starts, the groundwater quality analysis will be carried out once in three months within the project site.

The parameters to be monitored are physical, chemical and biological characteristics.

**OPERATION PHASE:**

During operation phase of the project, ground water quality analysis will be carried out once in six months within the project site. Along with this, regular analysis (monthly once) of sewage treatment plant (STP) treated water will be carried out for the following parameters, which will be maintained within the prescribed KSPCB limits.

And also water conservation methods used are to be done regularly which includes,

- Use of water meter conforming to ISO standards will be installed at the inlet point & at the discharge point to monitor the daily water consumption.
- Implementation of dual piping system.

- Awareness among the occupants regarding optimal usage of water & reuse.
- Rainwater harvesting facilities are proposed.
- Immediate attention towards the leaky plumbing fixtures.

**TABLE 6.1: QUALITY OF TREATED SEWAGE FOR URBAN REUSE**

| Sl. No. | Parameters                  | Standards |
|---------|-----------------------------|-----------|
| 1       | p <sup>H</sup>              | 6-9       |
| 2       | BOD <sub>5</sub> mg/l       | ≤ 10      |
| 3       | Turbidity, NTU              | ≤ 2       |
| 4       | E-Coli                      | None      |
| 5       | Res. Cl <sub>2</sub> , mg/l | ≥ 1       |

Note: Urban reuse includes landscape irrigation, vehicle washing, toilet flushing, use in fire protection and commercial air conditioners.

## **6.2.4 LANDSCAPE DEVELOPMENT**

### **CONSTRUCTION PHASE:**

Initial landscape development will be started during construction phase itself, and landscape activities will be carried out on setback area, on walk ways etc.

### **OPERATION PHASE:**

Once project starts operation, other landscape activities will be done and maintenance of the same will be carried out by maintenance staff.

Landscape maintenance activities include

- Fertilizer dosing
- Repotting
- Watering etc.

## **6.3 INFRASTRUCTURE FOR ENVIRONMENTAL PROTECTION**

In the proposed Assetz residential apartment project the infrastructure facility for environmental protection will be established. This cell shall be head by project manager supported by junior staff and maintenance staff; this cell will be framed to monitor the environmental status periodically in operation phase.

Following table depicts the list of equipments used; test method and monitoring schedule for environmental parameters.

**TABLE: 6.2. LIST OF EQUIPMENTS USED AND TEST METHOD**

| Sl No | Attributes               |                  | Equipment Used                    | Test Method |
|-------|--------------------------|------------------|-----------------------------------|-------------|
| 1.    | Ambient Air              |                  | High Volume air sampler           | IS 5182     |
| 2.    | Ambient Noise            |                  | Noise dosimeter/Sound level meter | Lab Method  |
| 3.    | Stack Monitoring         |                  | Stack Monitoring kit              | IS 5182     |
| 4.    | Water (Ground & Surface) | Chemical         | Manually - Standard Procedure     | IS 3025     |
|       |                          | Micro biological | Manually- Standard Procedure      | IS 1622     |
| 5.    | Waste Water              |                  | Manually- Standard Procedure      | IS 3025     |
| 6.    | Soil                     |                  | Manually- Standard Procedure      | Lab Method  |

**TABLE: 6.3. MONITORING SCHEDULE FOR ENVIRONMENTAL PARAMETERS**

| Sl. no    | Particulars                                     | Monitoring frequency | Duration of sampling             | Important monitoring parameters                                            |
|-----------|-------------------------------------------------|----------------------|----------------------------------|----------------------------------------------------------------------------|
| <b>1.</b> | <b>Stack Monitoring</b>                         |                      |                                  |                                                                            |
|           | DG stacks at project premises                   | Once in three months | As per the standard procedure    | SO <sub>2</sub> , NO <sub>x</sub> , SPM, CO, Temperature, Flow Rate        |
| <b>2.</b> | <b>Ambient air quality Monitoring</b>           |                      |                                  |                                                                            |
|           | Project premises                                | Once in three months | 24 hours Continuous              | PM <sub>10</sub> & PM <sub>2.5</sub> , NO <sub>2</sub> , SO <sub>2</sub>   |
| <b>3</b>  | <b>Ground/Drinking Water Quality Monitoring</b> |                      |                                  |                                                                            |
|           | Ground water at project site                    | Once in three months | Grab sample                      | Parameters specified under As per IS -10500, 1993                          |
| <b>4</b>  | <b>Sewage Quality Monitoring</b>                |                      |                                  |                                                                            |
| I         | Raw Sewage                                      | Monthly once         | Composite                        | p <sup>H</sup> , BOD <sub>5</sub> , Turbidity, E-Coli, Res.Cl <sub>2</sub> |
| II        | Treated sewage prior to discharge               | Monthly once         | Composite                        | p <sup>H</sup> , BOD <sub>5</sub> , Turbidity, E-Coli, Res.Cl <sub>2</sub> |
| <b>5</b>  | <b>Ambient noise levels</b>                     |                      |                                  |                                                                            |
|           | Project premises in 2 locations                 | Once in a months     | 8hr continuous with 1hr interval | Ambient Noise Standards                                                    |
| <b>6</b>  | <b>Greenbelt development</b>                    |                      |                                  |                                                                            |
|           | Project premises                                | Continues            | Continues                        | --                                                                         |

#### 6.4 COST PROVISION FOR ENVIRONMENT MANAGEMENT

Total capital cost allocated towards environmental pollution control measures is about Rs. 919.5 Lakhs including existing and the Recurring cost (operation and maintenance) will be about Rs. 21 Lakhs per month. The break - up of Environment Management cost for the project is given in the Table - 6.4.

**TABLE: 6.4. BUDGETARY PROVISION FOR ENVIRONMENTAL MANAGEMENT PLAN**

| Sl. No.           | Description                                                  | Capital Cost (Rs. In Lakhs) | Operating & maintenance Cost (Rs. In lakhs/ month) |
|-------------------|--------------------------------------------------------------|-----------------------------|----------------------------------------------------|
| 1.                | Sewage Treatment Plant                                       | 96                          | 10                                                 |
| 2.                | Landscape Development                                        | 23                          | 3                                                  |
| 3.                | Solid waste Management                                       | 15                          | 5                                                  |
| 4.                | Rainwater harvesting facilities (Collection & Recharge pits) | 83.5                        | 3                                                  |
| 5.                | Solar water Heaters                                          | 52                          | --                                                 |
| 6.                | Fire safety & protection                                     | 650                         | --                                                 |
| <b>Total Cost</b> |                                                              | <b>919.5</b>                | <b>21</b>                                          |



TABLE: 6.5. ENVIRONMENTAL MONITORING PLAN & COST DURING OPERATION PHASE

| Sl. No.                              | Item                 | Parameter                                                                | Frequency | Location                         | Unit cost per sampling & Analysis (Rs) | Samples per year (No) | Cost per year (Rs) |
|--------------------------------------|----------------------|--------------------------------------------------------------------------|-----------|----------------------------------|----------------------------------------|-----------------------|--------------------|
| 1                                    | Air quality          | PM <sub>10</sub> & PM <sub>2.5</sub> , NO <sub>2</sub> , SO <sub>2</sub> | Quarterly | 2 sites around periphery of site | 5300                                   | 8                     | 42,400             |
| 2                                    | Noise Level          | Equivalent noise level                                                   | Monthly   | 2 sites around periphery of site | 600                                    | 24                    | 14,400             |
| 3                                    | Exhaust from DG set  | SO <sub>2</sub> , SPM                                                    | Quarterly | Stacks of DG sets                | 3000                                   | 32                    | 96,000             |
| 4                                    | Waste water analysis | pH, BOD, COD, TSS, TDS                                                   | Monthly   | STP                              | 2500                                   | 36                    | 90,000             |
| Total Cost During Operation Per Year |                      |                                                                          |           |                                  |                                        |                       | 2,42,800           |

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**CHAPTER - 7**

**ADDITIONAL STUDIES**

**7.1 ENVIRONMENTAL RISK ASSESSMENT AND DISASTER MANAGEMENT PLAN**

**RISK ASSESSMENT**

Risk assessment refers to identifying and evaluating hazards identified within the system. Risk assessment is the determination of quantitative or qualitative value of risk related to an actual situation and a recognized threat (also called hazard). In all types of engineering of complex systems sophisticated risk assessments are often made within safety engineering and reliability engineering when it concerns threats to life, environment or machine functioning.

And it is also an orderly way of studying and analysing the project, more than simply designing it and a clear understanding of the project objectives, all alternatives, and all issues that need to be considered during the design and construction.

The purpose of risk assessment is:

- To ensure that potential safety problems are properly understood or not.
- To check whether existing control measures (including emergency plans) are adequate or not.
- To determine what is necessary to reduce risks to a reasonable level.
- To prioritize unacceptable risks identified by the assessment and determine further action.

**RISK MANAGEMENT**

A risk management plan was developed to address the risk identified in the risk assessment process. Risk management is a structural approach to managing uncertainty related to threat, a sequence of human activities including: risk assessment, strategies development to manage it, and mitigation of risk using managerial resources.

The strategies include transferring the risk, avoiding the risk, reducing the negative effect of the risk.

#### **STEPS IN THE RISK MANAGEMENT PROCESS**

- Identification of risk in a selected domain of interest.
- Planning the remainder of the process.
- Mapping out the following
  - The social scope of risk management.
  - The identity and objectives of stake holders.
  - The basis upon which risks will be evaluated, constraints.
- Defining a frame work for the activity and an agenda for identification.
- Developing an analysis of risk involved in the process.
- Mitigation of risks using available technological, human and organizational resources.

The major risk identified due to the probable hazards in the project site during construction and operation phase of the project and precautionary measures as a part of emergency response plan is discussed in the below sections.

- Accident due to blasting (if any)
- Failure of machinery
- Working at heights
- Transport vehicles
- Loading and unloading
- Hazards pertaining to fires in buildings.
- Fire in diesel storage areas, garbage storage and disposal area.
- Earth quakes, Flooding
- LPG gas leak
- Electrical Accidents
- Spills
- Occupational Noise Exposure
- Housekeeping etc...

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**SAFETY ASPECTS PROPOSED DURING BOTH PHASES**

**DURING CONSTRUCTION:**

The project authorities must recognize the causes of safety hazards in construction site and establish programs, rules, regulations, guidelines, whatever else might be necessary to reduce accidents.

1. **Management:**

- The management structure and responsibilities of the various members of the project team, whether based at site or elsewhere.
- Arrangements for the principal contractor to give directions and co- ordinate other contractors.

2. **Standard setting:** The health and safety standards to which the project will be carried out. These may be set in terms of statutory requirements or higher standards that the client may require in particular circumstances.

3. **Information for contractors:** Informing contractors about risks to their health and safety arising from the environmental in which the projects are to be carried out and the construction work itself.

4. **Communications and co-operation:** Communicating and passing information between the project team, the designers, the planning supervisor, the principal contractor, other contractors, workers on site and others whose health and safety may be affected.

5. **Selection procedures:** Machinery and other plant supplied for common use will be properly selected, used and maintained; and that operator training will be provided.

6. **Information and training for people on site:** Arrangements need to be made by which the principle contractor will check that people on site have been provided with:

- Health and safety information
- Health and safety training
- Information about the project (e.g. relevant parts of the health & safety plan)

**SAFETY MEASURES DURING CONSTRUCTION:**

The safety procedures, norms and guidelines (as applicable) as outlined in the document Part 7 - Constructional practices and safety, 2005, National Building code of India, Bureau of Indian Standards shall be complied with.

- Provide clean drinking water to all workers.
- Provide adequate number of decentralized latrines and urinals to construction workers.
- Guarding all parts of dangerous machinery.
- Precautions for working on machinery.
- Maintaining hoists and lifts, lifting machines, chains, ropes, and other lifting tackles in good condition.
- Durable and reusable formwork systems to replace timber formwork and ensure that formwork where used is properly maintained.
- Ensuring that walking surfaces or boards at height are of sound construction and are provided with safety rails or belts.
- Provide Personal Protective Equipments (PPEs); helmets etc...
- Provide measures to prevent fires. Fire extinguishers and buckets of sand to be provided in the fire-prone area and elsewhere.
- Dangers, health hazards, and measures to protect workers from materials of construction, transportation, storage etc.
- Employment of Fire/Safety officer at project site

The following needs to be implemented:

**1. Fall Protection**

- \* The Contractor is required to provide fall protection to employees who are working at heights equal to or greater than 2m. Fall protection can be in the form of perimeter protection such as guardrails and toe rails, personal protective equipment (PPE), or a fall protection plan.
- \* Where scaffolds are not used, safety nets will be installed and maintained whenever the potential fall distance exceeds two storeys.

- \* The PPE standard should cover occupational foot, hand, head, hearing, and eye protection.
- \* To the greatest extent possible, working surfaces must be kept dry to prevent slips and falls and to reduce the chance of nuisance odours.
- \* All equipment and materials would be stored in designated storage areas that are labelled as such.

## **2. Ladders and Stairs**

- \* Portable ladders used for access to an upper landing surface must extend a minimum of 1.5 m above the landing surface, or where not practical, be provided with grab rails and be secured against movement while in use.
- \* The Contractor is required to inspect and maintain all ladders and temporary/portable steps to ensure that they are in good working condition.
- \* All ladders must be used only on stable and level surfaces.
- \* All access points must be kept clear.

## **3. Scaffolds**

- \* Access to Scaffolds - access to and between scaffold platforms more than 0.6m above or below the point of access will be made by portable/attachable ladders or ramps.
- \* Employees must never use makeshift devices, such as boxes and barrels, to increase the scaffold platform working level height.

## **4. Excavation**

- \* The area around the excavation must be protected with barrication and kept clear of surface encumbrances.
- \* Water would not be allowed to accumulate in the excavation.
- \* Guardrails or some other means of protecting people from falling into the excavation would be present.

## **5. Electrical Safety**

- \* If work has to be done near an overhead power line, the line must be de-energized and grounded before work is started.
- \* Fuses and circuit breakers would be used to protect motherboards, conductors and equipment
- \* Extension cords for equipment or as part of a temporary wiring system will not be damaged or compromised in any way and insulation must be of the highest grade.
- \* Temporary lights would not be suspended by their cords.
- \* All the necessary safety equipment and monitoring equipment to be provided
- \* Anytime electrical equipment is deactivated for repair, or circuits are shut off, the equipment will be locked out and tagged at the point where it can be energized.

#### **6. Occupational Noise Exposure**

- \* The Contractor would implement engineering controls to reduce noise levels.
- \* The Contractor would provide hearing protection to employees that are exposed to noise levels above the permissible limit.

#### **7. Cranes**

- \* A competent person has been designated to supervise activities that require the use of cranes.
- \* Cranes would not be operated near any power lines.
- \* All picks would be carefully planned to ensure that the crane adequately hoist the load.

#### **8. Welding and Cutting**

- \* The Contractor's employees would be trained in hot work procedures.
- \* There must be adequate ventilation to reduce the build-up of metal fume.
- \* The hot work operators would use proper personal protective equipment (i.e., welding helmet, burning goggles, face shield, welding gloves, and apron).
- \* There would be a fire extinguisher present at all welding and burning activities.



**9. Sign Boards/ Caution Boards**

- \* Signs and symbols would be visible during any construction activity that presents a hazard. Upon completion of such activity, the postings must be removed immediately.
- \* The Contractor would post specific DANGER signs when an immediate hazard exists and specific CAUTION signs when the potential for a hazard exists.
- \* Danger signs are posted at all immediate hazards (i.e. Danger: Open Hole).
- \* Caution signs are posted at all potential hazards (i.e. Caution: Construction Area, Caution: Buried Cable).
- \* Every floor, working place and passageway would be kept free from protruding nails, splinters, holes or loose boards.

**10. Fire Fighting**

- \* All new building construction will ensure compliance with applicable state, local, and national fire and life safety standards.
- \* Portable fire extinguishers will be installed
- \* Measures will be proposed to reduce the incidence of fires by eliminating opportunities for ignition of flammable materials
- \* Extinguishers must be noticeably located and readily accessible for immediate use in the event of fire.
- \* Extinguishers should be clearly visible. In locations where visual obstruction cannot be completely avoided, directional arrows will be provided to indicate the location of extinguishers and the arrows will be marked with the extinguisher classification.
- \* In the event of a fire emergency, a fire alarm would be provided for the building
- \* Inspection, maintenance, and testing of fire extinguishers will be ensured so that they are in proper working condition.
- \* Fire Hose would be provided at identified places and it should be free from any obstructions.

**11. First Aid**

- \* First-aid supplies approved by the consulting physician would be easily accessible when required.
- \* The first-aid kit would consist of materials approved by the consulting physician in a weather proof container with individual sealed packages for each type of item. The contents of the first-aid kit would be checked periodically to ensure that the expended items are replaced.
- \* Provisions would be made for prompt medical attention in case of serious injury.
- \* Proper equipment for prompt transportation of the injured person to a physician or hospital, or a communication system for contacting necessary ambulance service, would be provided.
- \* All the Emergency telephone numbers of the first Aider, physicians, hospitals, or ambulances would be posted.

**SAFETY MEASURES DURING OPERATION PHASE:**

- \* Proper fire exit plan and well planned fire hydrant facilities will be provided.
- \* All floors will be provided with Fire Alarm systems.
- \* Fire detectors will be provided in each room, passages of all floors.
- \* Each floor will be provided with portable fire extinguisher.
- \* Emergency Exit plan with Emergency contact numbers will be displayed at various locations.
- \* Occupants will be given training for emergency situations.
- \* DG oil and DG waste oil will be stored in leak proof containers at designated locations.
- \* Well planned traffic movement and parking facilities will be provided to prevent the accidents.
- \* Proper maintenance of Sewage treatment plant and Solid waste management plan to prevent the health hazards.
- \* Fire/Safety officer will be employed at project site.

- \* Onsite maintenance engineer and maintenance team will be there during operation phase.

## **7.2 DISASTER MANAGEMENT PLAN (DMP)**

As per Disaster Management Act, 2005 "Disaster means a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or man-made causes, or by accident or negligence which results in substantial loss of life or human suffering or damage to, and destruction of property, or damage to, or degradation of environment and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected areas."

It is also an unexpected event due to sudden failure of the system, external threats, internal disturbances, earth quakes, landslides, floods, fire and accidents etc. Disaster management plan is nothing but the preparedness in case of emergency situations in order to limit the impact of disaster events.

Types of Disasters:-

Broadly there are two types of disasters namely:-

- (i) Natural Disasters and
- (ii) Man-Made Disasters

Types of Natural Disasters:

- Floods, Droughts, Cyclones, Tsunami
- Heat and Cold waves, Global warming, Sea Level Rise, Ozone Depletion
- Landslides, Snow avalanches
- Earthquakes, Volcanic eruptions

Types of Man-Made Disasters:

- Accidents: - Road, Rail, Air, River, Sea, Transport of hazardous material, Building Collapse.
- Fires: - Buildings, oil fires.
- Poisoning: - Food, Water,
- Civil Conflicts: - Arson, sabotage, terrorist and other criminal activities.

Emergency plan deals with the strategic organizational management processes used to protect life and critical assets of an organization from hazard risks thereby decrease the financial loss to the organisation and to save lives as a result of the incident. Emergency and response plan prepared towards proposed project is enclosed as **Annexure-17**.

Bengaluru and surrounding regions are considered to be low damage zones as far as Earthquake (Risk Zone-II), Flooding, Landslides and Cyclone are concerned (Source: BMTPC Risk Zone Maps). However, in case of any eventual disasters, it is proposed to draw guidelines for reporting procedures, communication system and emergency action committee as follows:

- Earthquake resistant structures as per the standards applicable for Risk Zone II.
- Emergency action committee: To ensure coordinated action, an Emergency Action Committee shall be constituted to interact with:
  - Police officer of the area.
  - Transport corporation representatives.
  - Home guard representative.
  - Department of information and publicity.
  - Nearest medical facilities.
- Safe route to be used, adequacy of transport for evacuation and traffic control.
- Fire protection: The building materials would be of appropriate fire resistance standard. The fire resistance period would be at least 4 hours. Usage of wood will be minimum and restricted to only for door panels and shall not be used for any purposes, excluding artificial wood products, which are flame – resistant.

The extent of damage would be reduced by proper emergency response by the inhabitants. Awareness programs shall be organized to educate the general residents and train the members of emergency response group.

**PRECAUTIONS:****DURING CONSTRUCTION:**

- Use of water sprinklers to prevent dust from being air borne

- Providing suitable personal protective equipments (PPE) like mouth mask with filters, nose mask, helmets etc
- Periodic health check-up camp for the labourers will be arranged.
- Provision of safety belts
- In case of injury, on site medical treatment and transport will be organized.
- Employing a safety engineer

**DURING OPERATION:**

- Once the likelihood of the disaster is suspected, preventive actions should be undertaken by the project in-charge.
- Conditional maintenance of equipments, materials and expertise for use during emergency.
- The electrical systems shall be provided with automatic circuit breakers activated by over current.
- Fire extinguishers are provided at pre-notified locations inside the apartments.
- Proper escape routes are planned and displayed in the public domain.
- Selected representatives are given proper training to guide other inhabitants during fire accidents.
- Periodic awareness programme will be conducted for the occupants on their roles during emergency situations.
- Important telephone numbers like police authorities, fire department and hospitals etc. of use during emergency situations are made available.
- First aid kit with primary medicines will always be available in the medical centre.

**EMERGENCY DETAILS NEAR TO THE PROJECT SITE:**

|                         |                                  |        |
|-------------------------|----------------------------------|--------|
| Nearest Bus stand       | Doddakannelli bus stop           | 1 km   |
| Nearest Railway station | Carmelaram Railway Station       | 4 km   |
|                         | Bengaluru city railway station   | 17 km  |
| Nearest Fire station    | Sarjapur fire station            | 2.5 km |
| Nearest Airport         | Kempegowda International Airport | 35 km  |
| Nearest hospital        | Government hospital              | 1.8 km |

**7.3 NATURAL RESOURCE CONSERVATION**

Following are the few resource conservation measures will be adopted during construction as well as operation.

**DURING CONSTRUCTION:**

- Water requirement of construction will be minimized by using the ready mix concrete and other curing agents.
- Generated construction debris will be reused within the site for internal roads and walk way formation.
- Excavated topsoil will be conserved and reused for backfilling, landscaping and for road and driveway within the site.
- Storm water pollution prevention plan will be proposed, accordingly the storm water will be conserved through construction of catch pits and the same has been used for construction activities.
- Temporary seeding will be done like planting of fast growing grasses to hold down the soils in disturbed areas so that they are less apt to be carried offsite by storm water runoff or wind.
- Permanent seeding like use of permanent vegetation (grass, trees or shrubs) to stabilize the soil by holding soil particles in place.
- Building materials of low embodied energy and high strength are recommended as an alternative to the conventional building materials.
- Optimal transportation routes will be suggested for construction vehicles.
- Compensatory landscape will be done towards site clearance.

**DURING OPERATION:**

- Fresh water requirement of the project will be minimized by using the treated water for flushing and for landscaping.
- Generated STP sludge will be used as manure for landscaping.
- Usage of energy will be minimized by using energy efficient devices and controllers.

- Solar energy will be utilized for Solar lighting and provision is made of using solar geysers in the top two floors of each building.
- Generated organic waste will be processed in organic waste converter and manure will be used for landscaping.
- Utilization of DG sets will be restricted and will be used only during power failure, where it minimizes the fuel requirement.
- Roof rainwater collection will be done and the same will be used for domestic purposes after pre-treatment.
- Runoff from landscape and hardscape will be routed to recharge pits for ground water recharge.
- Extensive landscape will be done within the project site.
- Construction debris will be reused/ recycled for backfilling/ sub base works for roads, pavements and drains within the project site.
- Earth work excavated is managed through backfilling between foundations on the backside of retaining walls and also reused for filling up the low lying areas at site. Top soil will be reused for landscaping purposes.

#### **7.4 PUBLIC CONSULTATION**

The proposed project is a development of residential apartment; as per the EIA Notification 2006, the proposed project comes under item 8 i.e building and construction project with a built up area  $\geq 1,50,000$  Sqmt but  $\leq 3,00,000$  Sqmt and excluded from public consultation, hence public consultation is not required for the proposed project.

#### **7.5 RESETTLEMENT & REHABILITATION (R&R) ACTION PLAN**

Proposed project is a development of residential apartment, as per the revised master plan – 2015 of BDA the project site is designated as Residential zone and also land has been converted from agricultural to residential purpose.

Since the proposed project is a modification and expansion of residential apartment and also presently project is already started as per the existing



Environmental Clearance; hence the additional study does not involve resettlement and rehabilitation (R&R) action plan for the proposed developmental project.

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**CHAPTER - 8****PROJECT BENEFITS****8.1 GENERAL**

The proposed project will bring overall improvements in the locality, neighborhood and to the state by bringing industry, roads, water supply, drainage facility, power supply, employment for skilled, semi-skilled and unskilled labour, thereby uplifting the living standards of local communities and economic growth as well as it also stimulates the growth in small and medium scale industries like residential developments, hotels, shopping complexes, retail shops, health centers, educational institutes, recreational centers etc., may be further developed as a consequence.

Bengaluru is called as the "Silicon Valley" of India because of the large number of information technology companies located in the city. With the unparalleled increment of the IT sector in Karnataka capital, the demand has increased for both type of commercial and residential real estate in the destination of the city and its nearby area. This rise in demand will be considerably fulfilled by the proposed development and would be beneficial in reducing the demand of dwelling units in the city.

Bengaluru has an advantage due to the accessibility by all means of transportation systems. It has well connected via roads, rail and air. As the project accommodates residing population, there will not a positive change in the existing demographic pattern.

In operation phase, the proposed project would require significant workforce of skilled, semi-skilled and unskilled labours, improvement of personnel with better education and professional experience will result in increase of literacy in the locality and in surrounding villages.

**8.2 IMPROVEMENT IN THE PHYSICAL INFRASTRUCTURE**

Bengaluru is known as the Silicon Valley of India because of its position as the nation's leading IT exporter. A demographically diverse city, Bengaluru is a major economic hub and the second fastest growing major metropolis in India.

The beneficial impact of proposed project on the civic amenities will be substantial after the commencement of project activities. The basic requirement of the community needs will be strengthened by extending healthcare, educational facilities to the community, building/strengthening of existing roads in the area, providing water with drainage system, power supply, transportation facility etc,. Residential Apartment will initiate the above amenities either by providing or by improving the existing facilities in the area, which will help in uplifting the living standards of local communities.

Physical infrastructure includes the necessary infrastructural & technological facilities available in the locality for project operation. Residential Apartment is an expansion project which includes modernized technologies and infrastructural facilities like transportation, power connections, communication facilities, water supply and drainage facilities, internal drive way cum parking facility, landscape, rain water harvesting, solid waste management, and usage of solar energy etc. which will enhance the existing infrastructure and stimulates similar developments in the locality.

The construction of new roads/strengthening of existing roads in the project area and in surroundings will enhance the transportation facilities. Roads will be laid to facilitate the movement of materials and equipment during construction and operation of the units. However, permanent roads would be built on the basis of plant layout. With improved transportation facilities there is always a scope for development.

#### **TRANSPORTATION:**

The major mass transportation in Bengaluru is through buses; Buses are operated by Bengaluru Metropolitan Transport Corporation (BMTC) and are an important means of public transport available in the city and are highly reliable. As the road connectivity improves passenger will use transport vehicles like maxi cabs, cars and Auto Rickshaws and the numbers will also increases simultaneously. This is the healthy trend of a growing city. Railways and airlines are also located near the project area which will help the easy conveyance to the public.

The proposed project will create the demand on the existing transportation infrastructure and stimulates for new developments and also generate economic benefits to these sectors.

**WATER SUPPLY & DRAINAGE SYSTEM:**

Water supply to the Bengaluru city is majorly sourced from BWS&SB. Water requirement for the proposed project will also be sourced from Bore well, water supply line and drainage facilities still not be provided from BWSSB, which will helps for the proposed project as well as for other upcoming projects. With this, the proposed project will enhance the requirement and maintenance of water supply and drainage system.

The study area is well connected with natural drainage system; and well planned storm water management is proposed. i.e., all along the boundary of the site storm water drains will be provided. They would be adequately sized to prevent over flooding of the site. The storm water collection system will be designed in such a manner so that clean storm water from garden, parking areas, roadways and lawns will be used for recharging of ground water through recharge pits. The excess run off will be discharged in to the nearest storm water drain.

**POWER SUPPLY:**

The main power supply for the Bengaluru city is sourced from BESCO. Electricity is supplied from BESCO for various needs such as domestic utilities, industrial establishments and agricultural requirements etc. The study area is well connected with electricity supply network.

The required Electricity for our proposed project will be sourced from BESCO and it will enhance the demand for requirement and maintenance of the same.

**MISCELLANEOUS:** Almost all the basic civic amenities like Phone lines, post offices, electric poles, sewer lines etc. are provided in project surroundings.

**INDUSTRIAL SCENARIO:**

Bengaluru is home to many well-recognized colleges and research institutions in India. Numerous public sector heavy industries, software companies, aerospace, telecommunications, defense organizations and are located in the city. Bengaluru is a hub for biotechnology related industry and IT sector in India.

Major information technology companies such as Infosys, Cognizant, Wipro, I Gate, Tata Consultancy Services, Accenture, Nokia Siemens Network, US based companies like Texas Instruments, Google, IBM, Hewlett-Packard, Honeywell, Yahoo, Oracle, Cisco, Microsoft, Intuit and Intel have their research and development centers along with their corporate offices in Bengaluru. The proposed project will create the demand on the existing structure and stimulates economic benefits to these sectors.

**8.3 IMPROVEMENT IN THE SOCIAL INFRASTRUCTURE**

Due to proposed project activity; social infrastructure will improve by means of Civilization, standard of living, education, Vocational Training, and Basic Amenities. Additional benefits will be arrived from the proposed project like: healthcare, educational facilities to the community, community hall, sports centers, recreational centers, industrial developments, shopping malls, public services in the surrounding area.

Better education facilities, proper health care, road infrastructure and drinking water facilities are basic social amenities for better living standard of human being. Proposed project will further increase the above amenities directly/indirectly either by providing or by improving the existing facilities in the area, which will help in uplifting the living standards of local communities. Due to this project development adaptation of new technologies and other infrastructural facilities will improve which will indirectly boost the civilization of the surrounding people.

**EDUCATIONAL INSTITUTE:**

Education is an essential element of human development. It plays a major role in improving economic opportunities for people and enhancing their quality of life by building capabilities, enhancing skill levels and providing more productive

employment. The study region is well placed which is having adequate infrastructure facilities for education. Number of pre-primary, primary, middle, secondary and senior secondary schools exists in the area. There are also numerous professional institutions and other institutions offering specialized courses relevant to the present day job market. With the increase in demand, more growth in educational infrastructure will likely to come up in the project area.

The proposed project will create the demand on the educational institutes which enhances skill power, quality of life & standard of living.

#### **HEALTH CENTRES:**

The project area is in advantageous position in terms of healthcare infrastructure. There exist many general / intermediate hospitals, polyclinics, nursing homes, in the area. Many more government and private healthcare facilities are being developed in the project area due to this proposed project.

#### **BANKING:**

Productive activities are mostly represented by agriculture and industry. Organized and unorganized banking and other credit agencies including the government agencies help production by assisting capital formation and its channelization for various productive activities.

Being an industrially hyperactive region, the financial needs in the project area is sufficiently served by the vibrant Banking institutes. Besides almost all of the nationalized banks and local co-operative banks, numerous multinational banks have also been rendering services over the region, hence it provides,

- ☞ Foreign exchange earning to the destination country.
- ☞ It will be helpful in raising the GDP (Gross Domestic Product) of the country.
- ☞ Increases revenue to the country by way of royalty, taxes and duties.

Additional benefits will be arrived from the proposed project are as mentioned below:

- ☞ Increase the demand for all other sectors like commercial and retails.

- ☞ Further development of small and medium scale industries may be developed as consequence.
- ☞ Increased revenue to the state by way of royalty, taxes and duties.
- ☞ Attracts more number of people for plenty of job opportunities.
- ☞ Infrastructure development.
- ☞ It raises the living conditions of the citizens of the country.
- ☞ Cultural exchange is also possible through the project.
- ☞ Self-employment gives a new boost to the country.

#### **8.4 EMPLOYMENT POTENTIAL**

As the proposed project bring employment generation for skilled, semi-skilled and unskilled, it is obvious to assume that, all the economic activities in the project area would induce considerable improvement in the socio-economic levels of people. The impact of human settlement is expected to be positive, as apart from some people being directly employed; many others will get indirect employed.

The employment of local people in primary and secondary sectors of project shall upgrade the prosperity of the region. This in turn will improve the socioeconomic conditions of the area.

##### **DURING CONSTRUCTION PHASE:**

This project will provide temporary employment to many unskilled and semi-skilled laborers in nearby villages; project will also help in generation of indirect employment to those people who render their services for the personal directly working in the project.

The proposed project duration is approximately five years. Project may require around 150 numbers of coolies and others are around 50 members during the construction phase. The project will fulfill the job requirements for all kinds of people in various sectors, which increase the employment opportunity and improve the living standards.

##### **DURING OPERATION PHASE:**



The impact of the project on the economic aspects can be clearly observed. The proposed project activities will provide employment to persons of different skills and trades. The local population will be given preference to employment. The employment potential will ameliorate economic conditions of these families directly and provide employment to many other families indirectly who are involved in business and service oriented activities.

During operational phase, considerable number of people will be benefited by provision of services to the residents; some people may retain as permanent employee after the construction phase.

## **8.5 OTHER TANGIBLE BENEFITS**

Infrastructure development plays a very important role in the process of regional inversion. It provides a platform upon which the phenomena supporting regional inversion depend. The sponsor of the project is the best person to identify the benefits.

### **CORPORATE SOCIAL RESPONSIBILITY (CSR):**

M/s. APG Intelli Homes Private Limited is a Bengaluru based Public Limited Company with a primary objective of constructing and developing multi storied Residential Apartment and commercial spheres. The promoters of this company are engaged in the business of property development in and around Bengaluru.

In a short period, it has emerged as one of the leading developers in South India with its excellent projects of outstanding quality, reliability, affordability and efficient after-sales service. It has its own team of construction with huge and latest equipment including imported shuttering materials for speedy construction and equipments like cranes, batching plants, trucks etc

### **Some of the social responsibilities in concern with the proposed development:**

With respect to Assetz property in a variety of activities that help man co-exist with nature, such as employing local talent, help to conserve the environment and

ecology thereby minimizing the adverse effects of the project activity on the locality, its surroundings and an Environment.

➤ **Employment**

- ☞ There is an estimated employment opportunities for laborers during construction phase and permanent staff for various jobs like Manager, supervisor, housekeeping, Gardeners, STP maintenance, security during operational phase of the project.
- ☞ To encourage local talent, will increase local employment opportunities and thus will improve the local economy. Secondary employment opportunities anticipated in the vicinities in the form of tea/coffee shops, provision stores, hyper market, fruits/vegetable/flowers selling vendors, stationary shops, medical shops, etc., which will improve the standard of living conditions of the local region.

➤ **Recycling process**

- ☞ Wastewater from the proposed project as well as from other projects would be treated and reused for flushing, car washing
- ☞ STP sludge will be reused as manure for landscaping.

➤ **Rain water harvesting**

All the Assetz property projects have rain water harvesting systems in place to provide supplemental water for their requirements, to increase soil moisture levels, and improve ground water table levels.

➤ **Landscape Development**

All the Assetz property projects will have a well-planned Landscape, which will enhance the beauty of the aesthetics and were committed to delivering environmental-friendly quality buildings with state-of-the-art technology; which enhance the beauty of the area. Improve the avi-faunal population of the area and also helps in reducing the heat island effect.

➤ **Use of Renewable Resources**

All the Assetz properties projects will make use of renewable source of energy like solar street lights, solar heater etc, which will conserve the energy and reduces the load on the project.

➤ **Road & Drainage**

All the Assetz properties will have well planned internal road and drive way facilities as well as internal drainage systems, which will improve the better management and maintenance.

➤ **Sewage treatment plant**

All the Assetz properties will have well planned STP facilities of adopting efficient cum advanced technologies, which improve the sanitation facilities and reduces the load on fresh water requirement.

➤ **Education**

Assetz has been setting up Creche and imparting education to the workers' children at every worksite, encourages workers to send their children to school. While helping them carve a better future for themselves, they also ensure to provide mid-day meals to the children.

Along with the above, Assetz have always been on the lookout of conducting CSR activities which directly make a benefit on society. Some of such initiative that took up is thoroughly explained in chapter-12.

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**CHAPTER - 9****ENVIRONMENTAL MANAGEMENT PLAN****9.1 INTRODUCTION**

The Environmental Management Plan (EMP) is aimed at mitigating the possible adverse impact of a project and ensuring the existing environmental quality. The EMP converse all aspects of planning, construction and operation of the project relevant to environment. It is essential to implement the EMP right from the planning stage continuing throughout the construction and operation stage. Therefore the main purpose of the Environmental Management Plan (EMP) is to identify the project specific activities that would have to be considered for the significant adverse impacts and the mitigation measures required.

The identification and characterization of impacts has been presented in chapter-4 which dealt with Impact Assessment. It has been evaluated that, the project area will not be affected significantly with proposed project. Mitigation measures at the source level and an overall management plan at the site level are elicited so as to improve the surrounding environment. The Environmental Management Plan (EMP) is the road map for implementing mitigation measures to prevent the impacts arising from a particular project.

The construction phase impacts are mostly short term, restricted to the plot area and not envisaged on the larger scale. In the operational phase the environmental impacts are due to continuous operation of the project, hence, the emphasis in the Environment Management plan (EMP) is to minimize such impacts. The following mitigation measures are recommended in order to synchronize the economic development of the project area with the environmental protection of the region.

The emphasis on the EMP development is on the followings,

- Incorporating Green Building concept from the design to execution stage.
- Mitigation measures for each of the activities causing the environmental impact.
- Monitoring plans for checking activities and environmental parameters and monitoring responsibilities.

- Role responsibilities and resource allocation for monitoring; and
- Implementation of the scheduled plan.

Environmental management plan has been discussed in the following sections separately for construction phase and operational phase.

## **9.2 EMP DURING CONSTRUCTION PHASE**

The Construction Environmental Management Plan is one of the most important documents for managing and monitoring the environmental impact of a construction site.

The EMP describes the proposed measures to be implemented to help, achieve and maintain acceptable levels of environmental impact. Proponents having the responsibility and will ensure the relevant employees are fully cognizant of and abide by the Environmental Management Plan. In order to measure the performance of our environment management system the following environmental goals have been stated for the project implementation.

- Training of all employees in environmentally relevant activities of the environmental management system.
- Reduction of the noise at the construction sites.
- Reduction of lost-time accidents at the construction sites.
- Prevention of environmental incidents at the construction sites.
- Implementation of project procedure for environmental requirements.

### **9.2.1. OBJECTIVES**

The primary objective of environmental management plan is to initially limit the amount of generated construction wastes on this project by requiring all subcontractors and material suppliers to limit the quantities of materials and to supply only required materials those necessary for the project. The secondary objective is to divert 50 to 75% of the total wastes on this jobsite from area landfills at no cost premium to the project.

Every effort will be made to limit, separate, sort, collect and properly dispose of all construction waste materials generated on this project site during construction

phase. EMP includes the following management programs for the construction activities, which need to be monitored and managed during its construction phase.

#### **9.2.2. ENVIRONMENTAL AWARENESS TRAINING PRIOR TO COMMENCING WORK**

The proponent shall ensure that all construction personnel, including senior site staff, sub-contractors and suppliers, etc attend an environmental awareness information session prior to commencing work on site. Additional staff, sub-contractors and suppliers coming onto the site must be made aware of the requirements of the EMP.

#### **9.2.3. DEMARCATION OF THE SITE**

The 'site' here refers to all areas required for construction purposes. The proponent shall demarcate the boundaries of inner limits of the site. Netting should be provided preventing building material from falling. The proponent shall maintain the demarcation line and ensure that materials used for construction site do not blow on or move outside the site and environs, or pose a threat to flora/fauna of that area.

#### **9.2.4. LEVELING AND SITE CLEARANCE**

Vegetation clearing to allow for site establishment as well as construction purposes will sometimes be required. Vegetation can be cleared mechanically with a bulldozer, but should be cleared by hand on other areas. All alien vegetation shall be eradicated from site during the site preparation. Indigenous vegetation that does not pose any risks to the operation of the project upon completion of the contract should be retained for esthetical purposes. Such vegetation shall be identified during design and clearly indicated on the site plans. Protected or endangered species of plants shall be retained where possible.

As the present project is involved under expansion proposal, hence there is no clearance of existing land. Excavation will be done for basement preparation and it will be restricted to minimize the excavation.

**TABLE 9.1: ENVIRONMENTAL MANAGEMENT DURING LEVELLING AND SITE CLEARANCE**

| <b>Environmental Impacts</b>                                                 | <b>Mitigation</b>                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Remarks</b>                                                                           |
|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Noise generation:<br>Caused due to Excavators and Bulldozers                 | <ul style="list-style-type: none"> <li>• Most optimum no. of operation by the heavy equipment.</li> <li>• Selection of equipment with less noise generation to be used.</li> <li>• The earth moving equipment shall be periodically checked and maintained for noise levels.</li> <li>• The workers shall be provided with adequate PPE such as ear plugs to reduce impact of high noise levels.</li> </ul>                     | To reduce noise level; equipment provided with noise control devices is only used.       |
| Dust generation:<br>Leveling operations results in the emission of the dust. | <ul style="list-style-type: none"> <li>• The site cleared shall be periodically watered to reduce emission of dust particles</li> <li>• Barricades like metal sheets should be provided all round the premises to avoid fugitive dust emission in to the neighbouring area apart from water sprinkling.</li> <li>• The workers shall be provided with PPE such as nose masks and goggles to reduce impact on health.</li> </ul> | The construction water requirement will be sourced from external tanker water suppliers. |

#### 9.2.5. TRANSPORTATION OF CONSTRUCTION MATERIALS

During the transportation of construction materials, minimum no. of vehicles will be used. Most optimum route is planned to reduce the impact of transportation activity on the environment. The proponent shall ensure that all suppliers and their delivery drivers are aware of procedures and restrictions in terms of this EMP.

**TABLE 9.2: ENVIRONMENTAL MANAGEMENT DURING TRANSPORTATION**

| <b>Environmental Impacts</b> | <b>Mitigation</b>                                                                                                                                                      |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Noise generation             | <ul style="list-style-type: none"> <li>• Quality fuel is used.</li> <li>• Periodic maintenance of vehicles is required.</li> </ul>                                     |
| Dust generation              | <ul style="list-style-type: none"> <li>• Quality packaging of the construction materials.</li> <li>• Construction materials shall be covered with tarpaulin</li> </ul> |



|                     |                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | <p>sheets to prevent the material from being air borne.</p> <ul style="list-style-type: none"> <li>• Material shall be appropriately secured to ensure safe passage between destinations during transportation.</li> <li>• The vehicle speed shall be regulated.</li> <li>• The workers transporting materials shall be provided with PPE such as nose masks to reduce impact of air borne dust on their health.</li> </ul> |
| Vehicular emissions | <ul style="list-style-type: none"> <li>• Periodic emission check for vehicles is required.</li> <li>• Clean fuel shall be used for vehicles.</li> </ul>                                                                                                                                                                                                                                                                     |

#### 9.2.6. CONSTRUCTION ACTIVITIES

##### CEMENT AND CONCRETE MIXING

- Unused cement bags shall be stored out of the rain where runoff won't affect it.
- Used (empty) cement bags shall be collected and stored in weatherproof containers to prevent windblown cement dust and water contamination.
- Concrete mixing directly on the ground shall not be allowed and shall take place on impermeable surfaces.
- All excess concrete shall be removed from site on completion of concrete works and disposed off at an appropriate disposal site.
- Wastewater from the concrete mixer after washing should be properly disposed to drainage.

During the construction work, the following impacts are identified to monitor and mitigate the level of impact.

**TABLE 9.3: ENVIRONMENTAL MANAGEMENT DURING CONSTRUCTION**

| <b>Environmental impacts</b> | <b>Mitigation</b>                                                                                                                                                                                                                                                                                  | <b>Remarks</b>                                          |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| Noise generation             | <ul style="list-style-type: none"> <li>• Selection of Less noise generating equipments.</li> <li>• Personnel Protective Equipment (PPE) such as ear plugs and helmets shall be provided for construction workers</li> <li>• The working hours shall be imposed on construction workers.</li> </ul> | Implementation responsibility: Contractor – Civil Works |
| Dust generation              | <ul style="list-style-type: none"> <li>• PPE in the form of nose masks shall be provided</li> </ul>                                                                                                                                                                                                | Implementation                                          |

|                                           |                                                                                                                                                                                                                                                                                                                         |                                              |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
|                                           | for construction workers. <ul style="list-style-type: none"> <li>• Use of water sprays to prevent the dust from being air borne.</li> <li>• Barricades like metal sheets should be provided all around the premises to avoid fugitive dust emission in to the neighbouring area apart from water sprinkling.</li> </ul> | responsibility:<br>Contractor                |
| Water Discharge from construction works   | <ul style="list-style-type: none"> <li>• Sewage generated from the construction labours will be collected in collection tank &amp; will be treated in septic tank</li> </ul>                                                                                                                                            | Implementation responsibility:<br>Contractor |
| Air Emissions from construction machinery | <ul style="list-style-type: none"> <li>• Periodic check and regular maintenance of construction machinery for emissions.</li> <li>• Clean fuel shall be used in equipments.</li> </ul>                                                                                                                                  | Implementation responsibility:<br>Contractor |

#### **9.2.7. NOISE POLLUTION & CONTROL**

Noise will be generated by construction activities such as vehicular movement, hammering, drilling, cement concrete mixing, welding etc. The proponent shall take all reasonable measures to minimize noise disturbance as a result of construction activities. These measures must comply with rules and regulations of the concerned Board and shall be limited to daylight hours.

Following are the control measures for noise pollution,

- Selection of less noise generating construction equipment.
- Quality fuel is used for vehicles.
- Personnel Protective Equipment (PPE) such as ear plugs shall be provided for construction workers.
- Periodic maintenance of vehicles is required.
- DG sets with acoustic enclosures complying to Environment (Protection) Rules is provided.
- Barricades are erected all along the site boundary to avoid noise nuisance on the surrounding population.
- Trained security men are deployed for smooth guiding entry/exist without traffic congestion which helps in reducing honking conditions.

**9.2.8. DUST POLLUTION & CONTROL**

Dust will be generated by construction activities such as excavation, filling, mixing, hammering, drilling, cutting, vehicular movement etc; the proponent shall take all reasonable measures to minimize the generation of dust as a result of construction activities.

Following control measures shall be used for dust suppression,

- Covering of material loads during transportation.
- Sprinkling of water on the material during transportation particularly in dry and wind season.
- Construction vehicles shall comply with speed limits.
- Haul distances shall be minimized.

**9.2.9. SOIL EROSION & SEDIMENTATION AND ITS CONTROL**

Construction activities such as earthmoving operations that disturb land areas depending on construction area affect the surrounding air and generate noise and vibration. During construction phase, a range of activities on construction sites has the potential to pollute surface water, these include earthworks, and construction works etc, that result in erosion and sedimentation. This erosion may result in a significant increase in sediment loads to receiving waters. Sediment, which results from the excessive erosion of disturbed soils, is the main sources of pollutants.

Following control measures shall be used for soil erosion and sedimentation.

- Before construction, care should be taken to keep vegetation clearing at a minimum.
- Re-vegetation of construction sites during and after construction is the most effective way to permanently control erosion.
- Mulching is used primarily to reduce the impact of rainfall on bare soil, to retain soil moisture, to reduce runoff, and often to protect seeded slopes.
- During construction, the proponent shall protect all areas susceptible to erosion by installing necessary temporary and permanent drainage works and by taking any other measures necessary to prevent storm water from concentrating in streams and scouring slopes.

**9.2.10. MATERIALS HANDLING AND STORAGE**  
**FUEL STORAGE**

During construction, fuels required for use shall be stored in a central depot at the construction camp at a location agreed upon by the concerned authority. The proponent shall take all the necessary precautions to prevent fires or spills at the fuel stores.

Following precautions will be taken during fuel storage:

- Tanks containing fuels shall have lid and shall remain firmly shut.
- Gas and liquid fuel shall not be stored in the same storage area.
- No smoking shall be allowed inside the stores and within 3m of the boundary.
- The proponent shall ensure that there is adequate fire-fighting equipment at the fuel stores.

**LUBRICANT STORAGE**

Lubricants will be stored in drums or tins that are either sealed or have tightly fitting caps. Decanting of lubricants must be carried out in a specific area that has been previously identified and suitably protected. Lubricants shall be stored under cover in a no smoking area. All lubricant impregnate cotton waste and rags shall be promptly disposed off and handled as hazardous waste.

**9.2.11. WASTE MANAGEMENT****9.2.11.1 WASTEWATER FROM CONSTRUCTION ACTIVITIES**

Construction water refers to all water affected by construction activities. The proponent shall construct and operate the necessary collection facilities to prevent pollution. The proponent shall adopt below mentioned measures in order to manage the construction wastewater.

- The proponent may discharge "clean" slit laden water overland and allow this water to filter into the ground.
- Proponent shall not cause erosion as a result of any overland discharge.
- All washing of plant/equipment/concreting equipment etc. shall take place within the construction camp.

- All washing operations shall take place off-site at a location where wastewater can be disposed of in an acceptable manner.

To prevent the contamination of water by materials used during construction:

- Materials are prepared and stored away from watercourses.
- Implement measures to prevent seepage of liquid materials into ground where it could contaminate groundwater.
- Ensure prompt cleaning up of accidental spillages.
- The machinery/equipment is maintained in a good operating condition.

#### **9.2.11.2 WASTE WATER FROM CONSTRUCTION LABOURERS**

The sewage generated from the labours during the construction is estimated to be about 7.2 KLD. This will be collected in collection tank and will be treated in septic tank.

#### **9.2.11.3 SOLID WASTE MANAGEMENT**

Solid waste here refers to all construction debris and domestic waste. The organic wastes collected and shall be handed over to the local body for further processing and recyclable wastes such as bricks, stone, metal, plastic, etc., will be handed over to the authorized waste recyclers. Hazardous wastes like waste oil from DG sets, used batteries, paint waste etc; will be handed over to the authorized hazardous waste recyclers.

The solid waste management includes the following mitigation measures.

- The proponent shall not dispose of any waste or construction debris by burning or by burying.
- On completion of construction, all leftover construction materials are to be removed from the working area.
- The proponent shall supply waste bins/skips throughout the site at locations where construction personnel are working.
- The bins shall be provided with lids and an external closing mechanism to prevent their contents blowing out.

- Bins shall be emptied on a daily basis. The bins shall not be used for any purposes other than waste collection.
- Collection system should be properly supervised so that quick and regular removal of waste from the dustbin is practice.

#### **9.2.11.4 DISPOSAL OF EXCAVATED EARTH AND DEMOLISED MATERIAL**

During site clearance, the demolished material generated such as bricks, stone, concrete will be used for site leveling and for back filling.

The excavated earth which is generated during construction will be used for back filling, for development of landscape and for road formation and therefore there will not be any solid waste problem from the generation of excavated earth.

#### **9.2.12. PERSONNEL SAFETY SYSTEM**

It is planned to adopt the safe working practices which shall govern all construction works undertaken throughout the project.

Following Safety Aids to all labourers will be provided:

- Safety Helmets
- Safety Belts/ Harness
- Safety Shoes
- Hand gloves
- Gumboots while concreting
- Safety Goggles while welding/ Stone dressing etc.
- Face masks and full body kit while Pest control

Implementation of Safety procedures such as:

- Using proper lifting techniques
- Using Safe Scaffold
- Hot work permits for Fabrication and Welding
- Height work permit

**9.2.13. HUMAN HEALTH AND SAFETY MANAGEMENT PLAN**

The objective is to ensure that the health and safety of on-site personnel is proactively managed during the construction stage of the project. Below are given the proposed project related human health and safety environmental concerns and its management

- The primary concern on potential health risks for the construction workers and employees on site during construction are associated with drinking water quality.
- Construction site will be provided with readily available first aid kits including adequate supply of sterilized dressing materials and appliances. An ambulance-on-call shall be provided to take injured or sick person to the nearest hospital.
- Each construction worker will be provided with safety gadgets and compulsorily made to wear them during the construction work. This will include protective footwear, helmets & gloves to all workers employed for the work on mixing, cement, lime mortars, concrete etc.; the welders protective eye-shields to workers who are engaged in welding works; ear plugs to workers exposed to loud noise; safety belts to the labours working at higher platforms; and masks to avoid dust.
- The project will strictly follow the statutory child labour act.
- The project will also ensure that no paint containing lead or lead products is used. The project will comply with all regulations & follow good construction & safety practices for scaffolding, ladders, working platforms, gangway, stairwells, excavations, etc.
- The project will take adequate precautions to prevent danger from electrical equipments. No material will be so stacked or placed as to cause danger or inconvenience to any person or the public.
- Regular health check-ups for the labourers will be conducted at site and also at the labour camp for free of cost. Mock-up fire drills and first aid training will be conducted at site at regular intervals.
- Work permit will only be given to labourers who are fit/capable to work at heights, handle heavy machineries, etc.



- All necessary fencing and lights will be provided to protect the public. All machines to be used in the construction will conform to the relevant Indian standard codes, will be free from patent defect, will be kept in good working order, will be regularly inspected & properly maintained as per IS provision.

#### **9.2.14. EMERGENCY PROCEDURES**

The proponent shall comply with the Occupational Health and Safety Act, National Building Regulations and other national, regional or local regulations with regard to safety on site. The proponent shall ensure that contact details of the local medical services are available to the relevant construction personnel prior to commencing work.

The Emergency plans should include the following procedures:

- Identification of key escape routes, how people can gain access to them and escape from them to a place of total safety.
- Arrangements for the safe evacuation of people identified as being especially at risk, such as those with disabilities, lone workers and young persons.
- Any machines/appliances/processes/power supplies that need to be stopped or isolated if there is a fire.
- Specific arrangements, if necessary, for high-fire-risk areas.
- Contingency plans for when life safety systems such as evacuation lifts, fire-detection and warning systems, sprinklers or smoke control systems are out of order.
- How the fire and rescue service and any other necessary services will be called and who will be responsible for doing this.
- Procedures for meeting the fire and rescue service on their arrival and notifying them of any special risks, e.g. the location of highly flammable materials.
- Plans to deal with people once they have left the premises.

### 9.3 EMP DURING OPERATION PHASE

In the operational phase the environmental impacts are due to continuous operation of the project; hence, the emphasis in the Environment Management Plan (EMP) is to minimize such impacts. Following are the identified operational phase activities in the impact assessment, which may have impact on the environment.

1. Air quality management
2. Water quality management
3. Noise quality management
4. Solid waste management
5. Storm water management
6. Transport management
7. Landscape development

#### 9.3.1. AIR QUALITY MANAGEMENT

The air pollutants likely to be emanated from the proposed project are PM, SO<sub>2</sub>, NO<sub>2</sub>, HC and CO mainly due to burning of liquid fuel in DG. Exhaust from DG set will be emitted from stack of adequate height for dispersion of gaseous pollutants. The green belt development is also proposed covering about 38.82% of the plot area will reduce PM levels. Following table presents the EMP for air quality management during operation phase.

**TABLE 9.4: AIR QUALITY MANAGEMENT DURING OPERATION PHASE**

| <b>Environmental Impacts</b> | <b>Mitigation</b>                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DG set                       | <ul style="list-style-type: none"> <li>• Equipment selected will ensure the exhaust emission standard as prescribed as per the latest amendments from the CPCB.</li> <li>• DG will be used as stand-by unit.</li> <li>• Periodic check and maintenance.</li> <li>• Use of ultra-low sulphur diesel.</li> <li>• Use of clean fuel by the DG sets will reduce the emission of pollutants.</li> </ul> |
| Ambient air quality          | <ul style="list-style-type: none"> <li>• Ambient air quality monitoring as per the guidelines at regular intervals.</li> </ul>                                                                                                                                                                                                                                                                     |

**9.3.2. WATER QUALITY MANAGEMENT**

Operational phase water requirement of project will be met by Bore well, as mentioned earlier. Water balance is presented in the earlier section. Following are some of the water quality management measures that would be adopted during the operation phase of the project.

- Ground water should not be abstracted without prior permission of the competent authority.
- Use of water meter conforming to ISO standards should be installed at the inlet point of water uptake to monitor the daily water consumption.
- Use of water efficient devices/fixtures and appliances should be promoted.
- Installation of dual flushing system should be considered to conserve water.
- Rainwater harvesting will be put into practice on regular basis.
- Practice of surface runoff harvest through recharge pits on regular basis.
- Sewage Treatment Plants should be monitored on a regular basis.

The sewage generated from the proposed project will be about 1115 KLD which will be treated in the Sewage treatment plant capacity of 1300 KLD using Sequencing Batch Reactor (SBR) technology. The treatment scheme for domestic effluents generated from expansion building has also been discussed in Chapter-2. Treated water will be reused for flushing, car & floor washing, gardening. Following Table 9.5 presents the EMP for water quality.

**TABLE 9.5: WATER QUALITY MANAGEMENT DURING OPERATION PHASE**

| <b>Environmental impacts</b>             | <b>Mitigation</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effluent from domestic water consumption | <ul style="list-style-type: none"> <li>• Treated with existing sewage treatment plant to produce tertiary treated water which is ultimately reused for domestic purposes such as flushing, landscaping and excess treated water used for Public park maintenance.</li> <li>• Following water conservation measures will be encouraged                             <ul style="list-style-type: none"> <li>▲ Awareness among the residents regarding optimal usage of water and reuse.</li> <li>▲ Implementation of dual piping system: Use of treated</li> </ul> </li> </ul> |

|  |                                                                                                                                                                                                                                                                                                                                                                              |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>sewage for domestic purposes like flushing, gardening after prior treatment.</p> <p>▲ Rainwater harvesting facilities are proposed.</p> <p>Roof top rain water will be harvested and it will be treated and reused after prior treatment.</p> <p>Surface runoff will be harvested and it will be used for ground water recharge through recharge pits within the site</p> |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**TABLE 9.6: WASTEWATER DISPOSAL**

|                                                |          |
|------------------------------------------------|----------|
| Total quantity of treated sewage to be managed | 1059 KLD |
| Treated sewage water used for landscaping      | 311 KLD  |
| Treated sewage water used for flushing         | 524 KLD  |
| Treated water used for car & floor washing     | 224 KLD  |

### 9.3.3. NOISE QUALITY MANAGEMENT

High noise generating units such as DG set will be provided with integral acoustic enclosure. Noise barriers will be provided to the DG sets at appropriate locations so as to ensure that the noise levels do not exceed the prescribed standards.

Green belt on the project boundary will further act as noise barrier and helps in attenuation of noise. Following table presents the EMP for noise levels.

**TABLE 9.7: NOISE MANAGEMENT DURING OPERATION PHASE**

| Environmental Impacts                           | Mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Noise from DG set operation & vehicular traffic | <ul style="list-style-type: none"> <li>▪ Acoustic enclosures will be provided to DG set.</li> <li>▪ DG set will be installed in an area (utility section) where the access will be restricted.</li> <li>▪ The use of PPE (ear plugs) will be mandatory in this area.</li> <li>▪ Selection of equipment to ensure that the residual noise level of &lt; 55 dB (A).</li> <li>▪ Noise levels will be checked periodically using a noise pressure level meter.</li> <li>▪ Landscape development within the proposed site will act as a noise attenuator &amp; will be implemented gradually in parallel with the construction.</li> </ul> |

**9.3.4. SOLID WASTE MANAGEMENT**

The solid wastes generated during operation phase can be categorized under the following three types:

- Municipal Solid Wastes
- Hazardous wastes
- E- Wastes

**Municipal Solid Wastes:**

The municipal solid wastes include food leftovers, vegetable peels, plastic, house sweepings, paper, cardboard clothes, ash etc. The municipal solid wastes generated in the premises are estimated to be about 4.2MT/day. Out of which, 2.1MT/day is Organic waste & 2.1MT/day is recyclable wastes.

- \* Further this organic biodegradable waste will be segregated and will be processed in organic waste converter.
- \* The recyclable wastes such as plastic materials, glass & metal wastes are handed over to the authorized waste recyclers for further processing.
- \* The Sludge from the STP will be used as manure for gardening purpose.

**Hazardous Wastes:**

Hazardous wastes like waste oil generated from the DG sets will be stored in barrels and handed over to the authorized waste oil recyclers/processors & the generated used batteries, battery cells etc., will be handed over to the authorized hazardous waste recyclers.

**E- Wastes:**

E- Wastes like electrical wastes such as wires, bulbs, tube lights and electronic wastes such as used PC, calculators, CD's, Xerox machine components etc., will be collected separately & handed over to the authorized & approved by KSPCB E-waste processors.

The various mitigation measures to be adopted for the solid waste management during operation phase are as follows:

- Different colored bins will be provided for different categories of waste and ensure complete segregation of biodegradable and non-biodegradable wastes. The biodegradable wastes will be processed in organic waste converter and recyclable wastes such as plastic materials, glass & metal wastes are handed over to the waste recyclers.
- Separate compartments shall be provided for each type of recyclables.
- Collection and storage of hazardous wastes during pre-construction and post-construction activity should be planned properly.
- The expected hazardous wastes should be disposed off separately as per the Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008.
- Separate bins shall be provided in each building to collect the solid wastes.
- Collection system should be properly supervised so that quick and regular removal of waste from the dustbin is practice.
- It is preferable that the container and bins used for collection of waste should be of closed type so that the waste is not exposed and thus the possibility of spreading of disease through flies and mosquitoes is minimized.

#### **9.3.5. STORMWATER MANAGEMENT**

As the project location is blessed with fairly good rainfall, it is planned to collect the storm water at different gradients of the location. There will be rainfall runoff from building roof-tops, roads and pavements and greenbelt area. Necessary provision will be made to collect the quantity of rainfall runoff during the most rainy day of season.

- Necessary rain harvesting pit/ recharge pit at regular intervals around the periphery of the site have been envisaged.
- Storm drains with RCC precast perforated cover will be provided around the periphery of property.
- The details of the rain water harvesting facilities are interpreted in the early section and it is depicted in the enclosed layout plan.

**9.3.6. TRANSPORT MANAGEMENT**

- Use of public mode of transportation should be encouraged.
- Use of the least polluting type of transportation should be promoted.
- Adequate parking space should be provided as per norms.
- Use of pathways covered or shadowed by tree canopy as far as practicable.

**9.3.7. GREENBELT DEVELOPMENT**

Vegetation is the natural extension of the soil ecosystem on a site. It can provide summer shade, wind protection, and a low-maintenance landscape that is adapted to the local environment. Unfortunately, the common practice is to remove the existing landscape cover and replace with a generic, water and maintenance-intensive lawn.

The greenbelt development in the project site area not only functions as landscape features resulting in harmonizing and amalgamating the physical structures of proposed buildings with surrounding environment but also acts as pollution sink / noise barrier. In addition to augmenting present vegetation, it will also check soil erosion, make the ecosystem more diversified and functionally more stable, make the climate more conducive and restore balance.

It is planned to include an ecologically knowledgeable landscape architect as an integral member of the design team. Preservation of existing vegetation, especially native plants, will possibly be incorporated. Avoid fencing off property where possible to make landscape available to community increasing project integration. Besides this, the visual aesthetic of the proposed site will be enhanced by developing lawn with local ornamental plants in open spaces.

**9.3.8. FIRE PROTECTION**

The fire fighting requirements depend on occupancy classification and height of the proposed building. The proponent shall comply with the Occupational Health and Safety Act and regional or local regulations with regard to safety on site. Depending upon the occupancy heights, buildings should be protected by wet riser, automatic sprinkler system, and fire water tanks as applicable.

The Project has been designed based on all the relevant fire safety as per NBC norms.



- \* Fire extinguishers systems are deployed throughout the residential building.
  - ✓ ABC powder Extinguisher - 5 kg should be provided in transformer yard electrical room and same should provide for every 8 car parks.
  - ✓ ABC powder extinguisher - 2 kg should be provided in kitchen area and lift area
  - ✓ Fire buckets filled with clean water and sand kept in a common stand provided at each stair case landing.
- \* Fire hydrants around the building.
  - ✓ Internal system - Wet riser cum down comer
  - ✓ External system – yard hydrants.
- \* Fire hose cabinets provided at every floor.

Precautions & safety Measures proposed are:

- Sufficient capacity of Fire water tank will be provided for immediate action to arrest the fire accident.
- Nearby Fire Station contact numbers will be displayed
- Sprinkler System, Automatic fire detection & Alarm system will be provided.
- Smoking should be strictly prohibited.
- Provision of helipad for the proposed building in case of emergency.

### **9.3.9 HEALTH, RISK AND DISASTER MANAGEMENT**

#### **PUBLIC HEALTH AND SAFETY**

Since all the construction related activities shall be confined to the project site, minimal health related impacts are envisaged within the project influenced area during the construction stage.

The persons engaged at project site will face direct exposure to dust and noise generated from the construction activity. This is likely to cause health related affects such as asthma, bronchitis etc. and hearing impairments respectively.

To minimize these anticipated impacts, suitable actions like

- Use of water sprinklers to prevent dust from being air borne.

- Providing suitable personal protective equipments (PPE) like mouth mask with filters, nose mask, helmets etc.
- Periodic health check up camp for the labourers will be arranged.
- Provision of safety belts.
- In case of injury, on-site medical treatment and transport will be organized.
- Employing a safety engineer.

Due to operation of the proposed project, there will be enhancement in public health and safety.

- Regular visit of resident medical officer to take care of the first aid and primary medication in case of emergency for occupants and labourers.
- First aid kit with primary medicines will always be available in the medical centre.
- Display of action plan and preparedness measures during emergency situations.

#### RISK AND DISASTER MANAGEMENT PLAN

Disaster is an unexpected event due sudden failure of the system, external threats, internal disturbances, earth quakes, fire and accidents. Thus an appropriate management plan shall be incorporated.

#### PRECAUTIONS

- Once the likelihood of the disaster is suspected, preventive actions should be undertaken by the project in-charge.
- Conditional maintenance of equipments, materials, and expertise for use during emergency.
- The electrical systems shall be provided with automatic circuit breakers activated by over current.
- Fire extinguishers are provided at pre-notified locations inside the buildings.
- Proper escape routes are planned and displayed in the public domain.
- Selected representatives are given proper training to guide other inhabitants during fire accidents.

- Periodic awareness program is conducted for the occupants on their roles during emergency situations.

Important telephone numbers like police stations, fire department and hospitals etc. of use during emergency situations are made available.

#### **9.4 EMP IMPLEMENTATION SCHEDULE**

Phased according to the priority, the implementation schedule is presented in below table.

**TABLE 9.8: IMPLEMENTATION SCHEDULE FOR EMP**

| <b>S. No</b> | <b>Recommendations</b>           | <b>Requirement</b>                          |
|--------------|----------------------------------|---------------------------------------------|
| 1.           | Air pollution control measures   | Before commissioning of respective building |
| 2.           | Water pollution control measures | Before commissioning of the project         |
| 3.           | Noise control measures           | Along with the commissioning of the project |
| 4.           | Solid waste management           | During commissioning of the project         |
| 5.           | Green belt development           | Stage-wise implementation                   |

The responsibility of EMP implementation lies with the project promoter for a period of 5 year (approximate Construction Period). Once project is established, the EMP responsibility will be properly handed over with clearly defined procedures and guidelines.

#### **9.5 ENVIRONMENTAL LEGISLATIONS**

There are many Environmental Acts & Rules which are formulated by Ministry of Environment and Forests (MoEF) for the prevention of Environmental squalor and are to be complied by the Industry. All the regulations are not applicable to all. The Act and Rules which are to be constantly perused and followed by the Industry are enumerated in the following section.

**TABLE 9.9: PARTICULARS OF ENVIRONMENTAL LEGISLATIONS**

| <b>YEAR OF ENACTMENT</b> | <b>LEGISLATION</b>                                        |
|--------------------------|-----------------------------------------------------------|
| 1974                     | The Water (Prevention and Control of pollution) Act.      |
| 1975                     | The Water (Prevention and Control of pollution) Rules.    |
| 1977                     | The Water (Prevention and Control of pollution) Cess Act. |

|      |                                                               |
|------|---------------------------------------------------------------|
| 1978 | The Water (Prevention and Control pollution).                 |
| 1988 | The Water (Prevention and Control of pollution) as amended.   |
| 1981 | The Air (Prevention and Control of pollution) Act.            |
| 1987 | The Air (Prevention and Control of pollution) and as amended. |
| 1986 | The Environment (Protection) Rules.                           |
| 1991 | The Environment (Protection) Rules (Amended).                 |

## **9.6 ENVIRONMENT PROTECTION ACT & RULES**

Among the various notifications coming under the Environment (Protection) Act, following are the notifications applicable to this project:

**TABLE 9.10: NOTIFICATIONS UNDER ENVIRONMENTAL PROTECTION ACT & RULES**

| <b>YEAR OF NOTIFICATION</b> | <b>RULES</b>                                                               |
|-----------------------------|----------------------------------------------------------------------------|
| 1989                        | The Hazardous Waste (Management & Handling) Rules                          |
| 2000 & 2003                 | The Hazardous Waste (Management & Handling) Rules (amended)                |
| 1992/1993                   | Environmental Statement                                                    |
| 2002                        | DG Rules                                                                   |
| 2000                        | Noise Pollution (Regulation & Control) Rules and Amendment Rule 2006       |
| 2000                        | Municipal Solid Wastes (Management & Handling) Rules                       |
| 2001                        | Batteries (Management & Handling) Rule, 2001 and Amendment Rule, 2010      |
| 2008                        | The Hazardous Wastes (Management, Handling & Transboundary Movement) Rules |
| 2011                        | The Plastic Waste (Management & Handling) Rules                            |
| 2011                        | The e-Waste (Management & Handling) Rules implementation from 1-5-2012.    |

### **THE HAZARDOUS WASTE (MANAGEMENT & HANDLING) RULES 1989**

#### **(LATEST AMENDMENT 2003)**

The DG Sets, waste/used oil is included in the schedule-1 of list of Hazardous Waste under Serial No.5 which states as under:

- ❖ Used/spent oil (category No.5.1) generated from industrial operations.
- ❖ Using mineral/synthetic oil as lubricant in hydraulic systems or other applications.

Used oil defined under Rule 3 (34) means any oil derived from crude oil or mixtures containing synthetic oil including used engine oil, gear oil, hydraulic oil, turbine oil, compressor oil, industrial gear oil, heat transfer oil, transformer oil, spent oil and their tank bottom sludge and suitable for re-refining, if it meets the specifications laid down in Schedule 5, but should not include waste oil.

Responsibility of the occupier and operator of a facility for handling of the wastes is delineated as under:

1. The Occupier and the operator of a facility shall be responsible for proper collection, reception, treatment, storage and disposal of hazardous wastes listed in schedule -1, 2 and 3 { Rule 4(1)}.
2. It shall be the responsibility of the occupier and the operator of a facility, to take all steps to ensure that the wastes listed in schedule 1, 2 and 3 are properly handled and disposed of without any adverse effects to the environment {Rule 4(3)}.
3. Hazardous wastes shall be collected, treated, stored and disposed of only in such facilities as may be authorized for this purpose {Rule 5(1)}.
4. Every occupier handling, or a recycler recycling, hazardous wastes shall make application in Form-1 to the Member Secretary, State Pollution Control Board or committee, as the case may be or any Officer designated by the State Pollution Control Board of committee for the grant of authorization for any of the said activities{ Rule 5(2)}.
5. The Occupier or operator of a facility shall ensure that the hazardous wastes are packaged, based on the composition in the manner suitable for handling, storage, and transport and the labeling and packaging shall be easily visible and be able to withstand physical conditions and climatic factors { Rule 7(1)}
6. Packaging, labeling and transport of hazardous wastes shall be in accordance with provisions of the rules made by the Central Government under the Motor Vehicles Act 1988 and other guidelines issued from time to time { Rule 7(2)}.
7. The occupier or an operator of a facility shall send annual reports to the State Pollution Control Board or committee in Form-4 {Rule 9(2)}.

8. All Hazardous waste containers shall be provided with a general label as given in Form-8 of Hazardous Waste (Management Handling) Rules 1989 as amended there after { Rule 7(3)}
9. The Occupier shall prepare six copies of the manifest in Form 9 comprising of colour code indicated below ( all six copies to be signed by transporter) {Rule 7(4)}:
10. The Occupier generating hazardous waste and operator of a facility for collection, reception, treatment, transport, storage and disposal of hazardous waste shall maintain records of such operations in Form-3 {Rule 9(1)}.
11. Where an accident occurs at the facility or on a hazardous waste site or during transportation of hazardous waste the occupier or Operator of a facility shall report immediately to the State Pollution Control Board or committee about the accident in Form-5 {Rule 10}.
12. No owner or occupier generating non-ferrous metal waste specified in schedule 4 or generating used oil or waste oil of ten tons or more per annum shall sell or auction such non-ferrous metal wastes, used oil or waste oil to a registered re-refiner or recycler, as the case may be, who undertakes to re-refine or recycle the waste within the period of validity of his certificate of registration (Rule 20(1)).

**TABLE 9.11: COLOUR CODE FOR THE MANIFEST COPIES**

| <b>Copy Number<br/>With Colour Code</b> | <b>Purpose</b>                                                                                                                                 |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Copy 1 (White)                          | To be forwarded by the occupier to the State Pollution Control Board or committee.                                                             |
| Copy 2 (Yellow)                         | To be retained by the occupier after taking signature on it from the transporter and rest of the four copies to be carried by the transporter. |
| Copy 3 (Pink)                           | To be retained by the operator of the facility after Signature.                                                                                |
| Copy 4 (Orange)                         | To be returned to the transporter by the operator of Facility after accepting waste.                                                           |
| Copy 5 (Green)                          | To be returned by the operator of the facility to State Pollution Control Board/Committee after treatment and disposal of wastes.              |
| Copy 6 (blue)                           | To be returned by the operator of the facility to the occupier after treatment and disposal of wastes.                                         |

**9.7 ENVIRONMENTAL STATEMENT**

Under rule 14 of the Environmental protection Rules 1986, every person carrying on an industry, operation or process requiring consent under Section 25 of Water (Prevention and control of Pollution) Act, 1974 (6 of 1974) or under Section 21 of the Air (Prevention and control of Pollution) Act, 1981 (14 of 1981 or both or authorization under the hazardous Waste (Management & Handling ) Rules 1989 issued under the Environment (Protection) Act, 1986 (29 of 1986) shall submit an Environmental Statement report for the financial year ending the 31<sup>st</sup> March in Form-V to the concerned State Pollution Control Board on or before 15<sup>th</sup> Day of September every year.



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**CHAPTER – 10****SUMMARY & CONCLUSION****10.1 EXECUTIVE SUMMARY****10.1.1 INTRODUCTION**

Introduction chapter explains purpose of the project, identification of the project, brief description of the project with nature, size, location & its importance to the country and its region and it also explains the scope of the study and applicable regulations on the proposed project.

M/s. APG Intelli Homes Private Limited is going for an Expansion of Residential Apartment by name "*Assetz Lifestyle - 63° East*" to set up a luxurious Residential Apartment at Kodathi Village, Varthur Hobli, Bengaluru East Taluk, Bengaluru. The proposed project is having total extent of land is 1,06,786.42 Sqmt (26.38 Acres) with a total built up area of 2,82,974.72 Sqmt, with sufficient area earmarked for landscape, internal drive way and other services. The master plan for the development comprises of components such as residential units, Civic amenities.

**10.1.2 PROJECT DESCRIPTION**

This chapter presents the type of the project, need for the project, and brief description of the project, location, magnitude and salient features of the project, resource requirement, waste generation and its management measures for both constructions as well as for operation phase.

This chapter also details the layout of the project & its components along with the project planning details which includes project feasibility reports and its schematics which explains the important information of the project.

**10.1.3 DESCRIPTION OF THE ENVIRONMENT**

This chapter explains on Baseline Environmental Status of the project site as well as the study area, study area considered for an Impact assessment, study period considered for an impact assessment and its objectives, components and methodology adopted to evaluate the baseline environmental status of the environmental

components. And it also explains the establishment of baseline for valued environmental components in an identified location with depiction on base map/topo map along with the results of the present environmental status.

The Baseline data describes the existing environmental status of the identified study area with reference to the prominent environmental attributes. An area covering 10 km radius, with project site as centre, is considered as the study area. The Baseline study was conducted in the month of April to June, 2017 i.e., for summer season.

The existing environmental setting is considered to establish the baseline conditions which are described with respect to geology, hydrogeology, climate, atmospheric conditions, water quality, noise quality, soil quality, vegetation pattern, ecology, land use and socioeconomic profile of people and the area.

The site-specific primary data were monitored for the identified parameters and supplemented by the available secondary data. Secondary data was collected from various Government and Semi - Government organizations. Baseline Environmental status is the most important study based on which probable impacts from the project are predicted.

#### **10.1.4 ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES**

This chapter deals with the details of investigated Environmental Impacts due to project location, possible accidents, project design, project construction, regular operations, final decommissioning or rehabilitation of a completed project.

And it also explains the assessment of significance of impacts and its irreversible & irretrievable commitments on Environmental components and its mitigation measures taken to minimize the identified adverse impacts.

#### **10.1.5 ANALYSIS OF ALTERNATIVES**

This chapter deals with availability and source of alternative technologies, adverse impact of the present technology, mitigation measures for the same and

selection of alternatives technology, resource conservation measures and the possibilities of selection of alternative site to minimize the adverse impacts.

#### **10.1.6 ENVIRONMENTAL MONITORING PROGRAM**

This chapter deals with the scheduling/planning of Environmental Monitoring Programme, which details the measurement methodologies adopted, frequency of monitoring, location of monitoring, data analysis, reporting schedules cum procurement schedule and infrastructure to evaluate the baseline environmental status as well as pedestal for prediction of impact of the future development.

#### **10.1.7 ADDITIONAL STUDIES**

This chapter deals with the risk assessment & its management plan and disaster management plan for construction phase as well as for operation phase; it also explains the measures to be adopted to conserve the natural resources. It depicts the necessity/requirement of public consultation, rehabilitation & resettlement action plan for the proposed project.

#### **10.1.8 PROJECT BENEFITS**

This chapter explains improvements in physical infrastructure, social infrastructure, and employment potential with other tangible benefits from the proposed project on the locality and on to the state.

#### **10.1.9 ENVIRONMENTAL MANAGEMENT PLAN**

This chapter explains objectives and importance of EMP as well as EMP (Environmental Management Plan) for construction phase and for operation phase as detailed in chapter - 9 and it also explains EMP implementation schedule, environmental monitoring routines and Environmental legislations cum Environmental protection act and rules applicable for the proposed project.

**10.2 CONCLUSION ON EXECUTIVE SUMMARY**

The proposed is an Expansion of Residential Apartment by name "*Assetz Lifestyle - 63° East*" is at Kodathi Village, Varthur Hobli, Bengaluru East Taluk, Bengaluru.

Due to change in the plan, project attracts EIA studies due to increase of built up area from 1,29,147.98 Sqmt to 2,82,974.72 Sqmt. The project is falling under item 8(b) and appraised as category 'B1' (since BUA  $\geq$  1,50,000 Sqmt but  $\leq$  3,00,000 Sqmt) as per the EIA Notification dated 14<sup>th</sup> September 2006 and the amendments thereof, proposed residential apartment project requires Environmental Clearance from MoEF (Ministry of Environment & Forests) for Modification & Expansion of "*Assetz Lifestyle - 63° East*".

As per the TOR prescribed by the State Level Environment Impact Assessment Authority- Karnataka dated on 28<sup>th</sup> April 2017, along with EIA GUIDANCE MANUL for Building, Construction, Township and Area Developmental Projects prepared by Administrative Staff College of India, Hyderabad dated February 2010 and as per the CPCB standard references, EIA (Environmental Impact Assessment) study has been carried out towards the proposed project.

With the above summary, the EIA study of the proposed Residential Apartment Project "*Assetz Lifestyle - 63° East*" has not been identified with any major negative impacts on the site and on to the local environment. As it involves the construction activity, there might be a chance of minor risks, for which all required precautions and preventive management plans are proposed.

And while in operation, the proposed development does not involve any processing/manufacturing activities and it is nil, whatever the impacts like generation of domestic wastewater, solid waste, waste oil etc., for that proper well planned Environmental Management Plan has been proposed along with this, for operation phase; other permanent Environmental Management Plans like well-planned storm water management, internal transportation management, sufficient parking provision, sewage treatment plant, organic waste converter, green belt development plan has been proposed and the same will be effectively implemented on the proposed project

and for the implementation of the same and its management EMP cell will be framed, along with this environmental monitoring routine plans are also proposed with estimated budgetary allocations.

However, development of this proposed residential apartment project has certain beneficial impacts/effects during the course of its construction and as well as in operational phase of the project.

**Some of the beneficial impacts/effects are:-**

- It will result in considerable benefits on physical infrastructures like transportation system, water supply & drainage system, power supply and social infrastructures like health centers, banking, education as well as small and medium scale industries like residential developments, hotels, shopping complexes, retail shops etc.,
- Improvement to the general aesthetics of the surrounding area.
- It will also bring employment generation to skilled, semiskilled and unskilled; it is obvious to assume that, all the economic activities in the project area would induce considerable improvement in the socio-economic levels of people. The impact of human settlement is expected to be positive, as apart from some people being directly employed, many others will get indirect employment.
- The impacts are identified and evaluated to reduce their negative impacts and maximize the positive effects on the surrounding environment.
- It raises the living conditions of the citizens of the country.
- During construction, erection of barricades around the periphery, traffic management, scientific management of solid waste, hazardous waste, bio medical waste and e-waste measures were undertaken towards better implementation of the project.
- During operation phase, use of ecofriendly methods such as sewage treatment plant, organic waste converter, energy conservation features, rain water harvesting & recharging, scientific disposal of hazardous waste, bio medical

waste and e-waste, green belt development and corporate social activities around the project site will benefit the environment.

- Overall, the proposed project will have positive impact on the Environment if, the recommended Environmental Monitoring, Health & Safety and Environmental Management aspects are fully implemented by the project proponents.

The project proponent believes in the concept of eco-friendly developments comprising of eco-friendly operations with as assurance of implementing all the commitments which are been illustrated in the EIA report. As per the approved Environmental Clearance and plan, construction of one of the tower has been started which is in footing stage and the expansion will be started once after getting amended Environmental Clearance for overall built up area 2,82,974.72 Sqmt; the project proponent "M/s. APG INTELLI HOMES PRIVATE LIMITED" will start the Residential Apartment, once after getting the necessary clearances.

As it is a construction project, Impacts from the proposed project will not reach behind 1 km, to prevent that proper mitigation measures has been adopted. Thus implementing this project will not have any appreciable negative impacts. Thus, the proposed project is a welcome development and request to accord Environmental clearance.

## CHAPTER - 11

### DISCLOSURE OF CONSULTANT ENGAGED

KRS Enterprises is a prominent provider of environmental consulting to wide range of clients. Our comprehensive range of diversified services includes obtaining environmental clearance from SEIAA/MoEF, CRZ clearance from MoEF, preparation of EIA/EMP and approval/authorization from KSPCB.

**TABLE-11.1: PROJECT DESIGN TEAM**

| SL NO | CONSULTANCY SERVICES                                           | NAME & ADDRESS OF THE CONSULTANTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------|----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.    | <b>Environmental Engineering Consultants</b>                   | <p><b>M/s. K.R.S. ENTERPRISES</b><br/>                     (Environmental Laboratory)<br/>                     AN ISO 9001 : 2008 CERTIFIED COMPANY<br/>                     #66/15, 1<sup>st</sup> Floor, 1<sup>st</sup> Cross, 1<sup>st</sup> Main Road,<br/>                     Ganganagar, Bengaluru - 560 032<br/>                     Tel Phone: 080-23437714<br/>                     e-mail: krs.operations@gmail.com<br/>                     krsenterprises09@gmail.com<br/>                     Web: <a href="http://www.krs-enterprises.com">www.krs-enterprises.com</a></p> <p>Covered by stay order WP. No. 15026-15038 of 2016, dated 26.03.2016 of Honorable High Court of Karnataka at Bangalore from being covered by the accreditation OM issued by MoEF</p> |
| 2.    | <b>Architects Consultants</b>                                  | <p><b>M/s. Architecture paradigm Pvt. Ltd</b><br/>                     No. 26, 4<sup>th</sup> 'B' Cross, Koramangala industrial Layout,<br/>                     Off Hosur Road, Koramangala,<br/>                     Bengaluru - 560095.<br/>                     Tel Phone: (91) 80 - 25536750<br/>                     e-mail: mail@architectureparadigm.com</p>                                                                                                                                                                                                                                                                                                                                                                                                             |
| 3.    | <b>Structural Consultants</b>                                  | <p><b>M/s. Ramboll india Private Limited</b><br/>                     INIZIO, unit No.301, 3<sup>rd</sup> floor, cardinal gracious Road,<br/>                     Opp. P &amp; G plaza, Chakala Andheri (E),<br/>                     Mumbai-400059.<br/>                     Tel Phone: (91) 22 - 42157800</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 4.    | <b>PHE &amp; Fire Consultants &amp; Electrical Consultants</b> | <p><b>M/s. MEP Consulting Engineers</b><br/>                     1<sup>st</sup> floor, 2245/1, 23<sup>rd</sup> cross, Banashankari II Stage,<br/>                     Bengaluru - 560070</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |



|    |                                                                             |                                                                                                                                                                                                                                                              |
|----|-----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5. | <b>Traffic Impact Studies<br/>&amp; Management<br/>Measures Consultants</b> | <b>M/s. Consortia of Infrastructure Engineers-CIE,</b><br># 004, 37/ 2-1, Ramky Samruddhi,<br>2nd main road, Thimmenahalli road,<br>Vijaynagar, Bengaluru-560040<br>Tel Phone: (91) 80 - 23403232,<br>mob:+919845049505<br>e-mail: consortia.infra@gmail.com |
| 6. | <b>Landscape consultant</b>                                                 | <b>M/s. Elements Design Studio</b><br>#4/1, Pinnacle Square, Second Floor,<br>Near 16 <sup>th</sup> Cross, 4 <sup>th</sup> Main, 80 Feet Double Road,<br>HIG Dollars Colony, RMV II Stage, Bengaluru-560094<br>Tel Phone: 9731412663,                        |
| 7. | <b>Lab Analysis Services</b>                                                | <b>M/s. K.R.S. ENTERPRISES</b><br>(Environmental Laboratory)<br>AN ISO 9001 : 2008 CERTIFIED COMPANY<br>#66/15, 1 <sup>st</sup> Floor, 1 <sup>st</sup> Cross, 1 <sup>st</sup> Main Road,<br>Ganganagar, Bengaluru - 560 032                                  |

**CORPORATE ENVIRONMENTAL RESPONSIBILITY**

Environment and natural resources are the prime source of all material inputs to economic activities. The environment also acts as a receiver and sink of the various kinds of waste generated through human activity. A proper balance between the developmental needs and environmental concerns is necessary in order to pursue the path of sustainable development.

Sustainable development involves an enduring and balanced approach to economic growth, social protection and justice, and environmental conservation.

The proposed project is a development of residential apartment project with a total built up area of 2,82,974.72 Sqmt. As per EIA notification dated 14<sup>th</sup> September 2006 and amended in 2016 proposed project comes under item 8(b) category of the said notification under Township & Area Development projects and appraised as category 'B1' (since BUA  $\geq$  1,50,000 Sqmt and  $\leq$  3,00,000 Sqmt).

As the proposed project attracts an EIA study, pre-construction baseline environmental study has been carried out, in accordance with that EIA has been prepared. In EIA, monitoring schedules for environmental attributes will be scheduled for construction phase as well as for operation phase to assess the quality of environment.

Environmental cell will be framed to manage/maintain Environmental and safety aspects such as labour health & safety, sanitation and other safety measures along with the environmental status during construction phase of the project.

Environmental cell will be framed to manage/maintain all environmental aspects, such as sewage treatment plant, solid waste management, maintenance of landscape and environmental monitoring of the project premises during the operation phase of the project. In addition, sufficient fund will be fixed for maintenance of EMP cell.

The provided details & documents towards the project are inline as per the final execution of the project. If any change in plan; prior intimation will be given to the

concerned authority & required statutory clearance/approval will be obtained before starting up of any activity.

Once after obtaining the Environmental Clearance, Environmental Compliance study with respect to EC conditions will be carried out during the construction phase twice in a year by considering the study periods from April to September and October to March and the report of the same will be submitted to the SEIAA and the regional office of MoEF, Bengaluru.

Similarly compliance study will be carried out by the maintenance team during operation phase. All other required statutory clearances will be obtained from the concerned department; therefore there won't be any violation/noncompliance in the proposed project.

**Technical Clearance:**

- (i) No Objection Certificate from Central Ground Water Authority
- (ii) No Objection Certificate from BESCOM
- (iii) No Objection Certificate from Fire Authority
- (iv) Earlier Environmental Clearance issued from GOI, MoEF, New Delhi
- (v) Consent for Expansion (CFExp) has to be applied for Karnataka State pollution Control board (KSPCB)
- (vi) Compliance for the earlier Environmental Clearance was submitted to SEIAA and Regional office, MoEF, Bangalore

**ENVIRONMENT SUSTAINABILITY AND CSR RELATED ISSUES:**

A company's sense of responsibility towards the community and environment (both ecological and social) in which it operates.

Corporate Social Responsibility is a management concept whereby companies integrate social and environmental concerns in their business operations and interactions with their stakeholders. CSR is generally understood as being the way through which a company achieves a balance of economic, environmental and social imperatives the roots of CSR lie in philanthropic activities (such as donations, charity, relief work, etc.) of corporations

- ✓ The CSR approach is holistic and integrated with the core business strategy for addressing social and environmental impacts of businesses.
- ✓ CSR needs to address the well-being of all stakeholders and not just the company's shareholders.
- ✓ Philanthropic activities are only a part of CSR.

**THE COMPANIES ACT, 2013:**

The concept of CSR is governed by clause 135 of the Companies Act, 2013, which was passed by both Houses of the Parliament. The CSR provisions within the Act is applicable to companies with an annual turnover of 1,000 Crore INR and more, or a net worth of 500 Crore INR and more, or a net profit of five Crore INR and more.

The Act encourages companies to spend at least 2% of their average net profit in the previous three years on CSR activities. The Act lists out a set of activities eligible under CSR. Companies may implement these activities taking into account the local conditions. The indicative activities which can be undertaken by a company under CSR as specified under Schedule VII of the Act are

Activities relating to: –

- 1) Eradicating extreme hunger and poverty;
- 2) Promotion of education;
- 3) Promoting gender equality and empowering women;
- 4) Reducing child mortality and improving maternal health;
- 5) Combating human immunodeficiency virus, acquired immune deficiency syndrome, malaria and other diseases;
- 6) Ensuring environmental sustainability;
- 7) Employment enhancing vocational skills;
- 8) Social business projects;
- 9) Contribution to the Prime Minister's National Relief Fund or any other fund set up by the Central Government or the State Governments for socio-economic development and relief and funds for the welfare of the Scheduled Castes, the Scheduled Tribes, other backward classes, minorities and women;

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**BENEFITS OF A ROBUST CSR PROGRAMME:**

As the business environment gets increasingly complex and stakeholders become vocal about their expectations, good CSR practices can only bring in greater benefits, some of which are as follows:

- Attracting and retaining employees: Several human resource studies have linked a company's ability to attract, retain and motivate employees with their CSR commitments. Interventions that encourage and enable employees to participate are shown to increase employee morale and a sense of belonging to the company.
- Communities as suppliers: There are certain innovative CSR initiatives emerging, wherein companies have invested in enhancing community livelihood by incorporating them into their supply chain. This has benefitted communities and increased their income levels, while providing these companies with an additional and secure supply chain.
- Enhancing corporate reputation: The traditional benefit of generating goodwill, creating a positive image and branding benefits continue to exist for companies that operate effective CSR programmes. This allows companies to position themselves as responsible corporate citizens.

Process of Corporate Social Responsibility can be implemented in following steps;

1. Developing a CSR strategy and policy
2. Formation of implementing committee
3. Due diligence of the implementation partner
4. Project development
5. Project approval
6. Finalizing the arrangement with the implementing agency
7. Progress monitoring and reporting
8. Impact measurement
9. Report consolidation and communication

Budget allocated towards CSR activities for Assetz Lifestyle 63°East project is Rs. 3,15,60,000 for 5-6 years in healthcare, education & infrastructure activities area.

Following are the CSR activities involved by the project

➤ **Shree Laxmi Institute for women and rural development**

As a social & Environment conscious company M/s. APG Intelli Homes Private limited has donated Rs.5 Lakhs to Shree Laxmi Institute for women and rural development, Belgaum towards Corporate Social Responsibility.

➤ **Health camp for migrant women at Kodathi Village**

As part of our social initiatives, we are conducted a free health camp at Kodathi government school. Assetz lifestyle partnered with the local NGO Pace Makers<sup>86</sup> Trust for conducting this program. As part of our initiative we had decided to cover cancer screening camp for migrant women labourers of construction companies in the Kodathi and nearby village.

- ☐ Shreenidhi constructions
- ☐ Road works for different parties
- ☐ General health check-up camp on National safety Day
- ☐ Cervical, breast and oral cancer screening camp

In the area of Health care, we have conducted more than five health camps at Kodathi Panchayath. Assetz lifestyle partnered with the local NGO Pacemakers<sup>86</sup> Trust & Help Age India for conducting these programs. As part of our initiative we covered Cervical, Breast and Oral Screening Camp for the people in the Kodathi and nearby villages. Objective of Health Check-up Camp is to support the communities around the project site and better their basic Living Conditions.

➤ **Multi-specialty health camp**

Assetz lifestyle partnered with the local NGO Help Age India organized Multi-specialty health camp at Kodathi on 19th March 2016. Objective of Health Check-up Camp to support the communities around the project site and better their basic Living Conditions. The primary objective is to provide a health check-up to needy people in Kodathi and surrounding villages who cannot afford medical care and rarely have access to health services.

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- **Distribution of education kits at Chicknayakanahalli government school for 52 students and RO water installation at Chicknayakanahalli government school for 52 students**

In the area of education, Assetz lifestyle supports schools by assisting the development of school infrastructure, distribution of teaching aids, teacher training and computer classes.

#### **Distribution of Education Kits:**

An education kit consisting of school bag, notebooks and stationery items were distributed to children of unskilled labourers and people below the poverty line, at Chicknayakanahalli government primary school. In this event we distributed this kit to 52 students of Chicknayakanahalli government lower primary school.

In our endeavor to improve the quality of current infrastructure of Chicknayakanahalli Primary School we took another step by providing RO unit and their maintenance service including requisite consumable

#### **School Enhancement Program:**

Aims to adopt government schools and support their holistic development. This includes infrastructure and teaching media to enhance quality of education and provide a safe and hygienic environment for students. At Chicknayakanahalli government primary school - Installation of RO water drinking unit, Construction of covered sanitation facility for all the students were provided.

- **Health Camp at leprosy Shelter**

We conducted health camps at leprosy colony in Kodathi. The key beneficiaries are poor and leprosy affected people and their families they live in, whose existence is virtually hand to mouth. Such beneficiaries cannot afford primary medical care. Through our field survey we identified 45 families in the Kodathi village affected by leprosy.



➤ **Food Supply in orphanages**

- Nutritious vegetables were supplied based on doctor's recommendations, to "Thaye mane" an orphanage, in Kodathi, this will help 125 children to get a luxurious lunch for one week.

➤ **Yoga Programs: -**

As part of our CSR initiative, we are conducting weekly Yoga classes for HIV infected children's at Sneha Care Home. The program culminates with nutritious food being distributed to the children.

**International Yoga day at Kodathi Government school**

We conducted yoga camp at Kodathi government school to commemorate the "International Yoga Day". The key beneficiaries were students from various educational institutions in the Kodathi Village, Chicknayakanahalli village and HIV infected children's at Sneha Care Home all located near the project site of Assetz 63° East.

➤ **TB programs -**

Supply of ration to 80 TB patients and Medical check-up by Assetz Lifestyle. There were almost 80 Multi drug resistant TB patients in Bengaluru Urban areas. These patients need both economical and emotional support. Providing them monthly rations will go a long way in providing solace to these unfortunate brethren. It was a privilege for Assetz group to distribute rations to the Multi Drug Resistant TB patients.

➤ **Health Camp - Mental Patients**

We organized health camps on 01-08-2017 & 05-09-2017- For about 200 to 250 Mentally ill patients from all over the south India congregate in Gunjur Government Hospital, Bangalore East, patients suffering from Epilepsy to schizophrenic and drug addicts were got treated